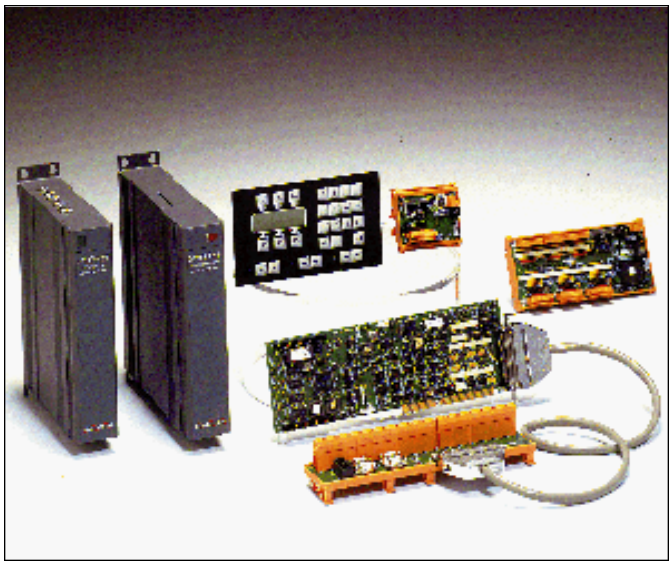


MINT™ Motion Products provide fast and accurate positioning with Baldor's Vector and Servo Drives.

Baldor's new range of motion control products are designed to solve your motion control needs, from the most simple single-axis indexer to a complex fully coordinated eight axis machine. A single, easy to use programming language, MINT™, is used to program all Baldor motion controllers, including the new MintDrives. Learn to program one, and you can quickly transition to other products in the family. A variety of MINT motion products are available from stock, and all can be used with Baldor's Vector and Servo Drives.

Product Characteristics

Product	Highlights
SmartMove	1,2,3 axes of vector or servo position control in a stand alone package.
	2mS servo update for three axes.
	Integrated machine I/O and CANbus network for I/O expansion.
	Optional operator panel.
	RS232/RS485 port for serial communications.
	Memory card for program/data expansion or transfer.
NextMove PCI	2-8 axes of vector, servo, or stepper position control in a PC ISA card.
	50MHz DSP processor delivers 200µSecond update for four axes.
	Integrated machine I/O and CANbus network for I/O expansion.
	Optional operator panel.
	Dual Port RAM for high speed communications to PC.
NextMove BX	2,3,4 axes of vector or servo position control in a stand alone package.
	33MHz DSP processor delivers 250µSecond servo update for four axes.
	Integrated machine I/O and 2 CANbus networks for I/O expansion.
	Optional operator panel.
	RS232 and RS485 serial ports for box to box communications.
NextMove RK	2,3,4 axes of servo or vector position control in a rack mounting card.
	33MHz DSP processor delivers 250µSecond update for four axes.
	Integrated machine I/O and CANbus network for I/O expansion optional operator panel
MintDrive	Motion controller and servo control combined into a single, easy to use package.
	Point to point moves, CAMs, gearing, flying shears, and other powerful motion features.
	2.5 through 15A continuous current ratings.
	Integrated machine I/O and CANbus for networking and I/O expansion.
	Optional operator panel.
	RS232 and RS485 ports for independent serial communications.
EuroCard Family	Family of low cost controllers for embedded OEM applications
	1,2,3 axes of vector, servo, or stepper control
	Full motion features including interpolated moves, CAMs, gears, flying shears etc.
	Wide range of accessories

MINT™ the Motion Language gets your motion control application moving in the shortest possible time.

MINT™ is Baldor's motion control language. It is easy to use and quick to execute, delivering powerful performance from your motion system in the shortest possible time. MINT integrates the key functions of motion control, I/O handling serial communications, CANbus networking and operator interface into a single programming language. With just one MINT programming language for all Baldor motion control products, you have the widest choice of motion solutions for the minimum of programming investment.

Programming Characteristics

MINT Command Types	Example
Positional Moves	Trapezoidal, S Curve, relative and absolute.
Multi-axis Moves	Linear and circular interpolated moves. Contoured, blended and spline move sequences.
Master/Slave	Software gearbox, CAMs and following.
Complex Moves	Flying shear, position offset.
I/O Handling	Interrupt driven inputs, error reporting outputs.
Communications	RS232/RS485 ASCII serial communications, ANSI 3.28 secure protocol transfer
CANbus Networking	Useful for adding an operator panel or additional I/O
Operator Interface	VT100 compatible command set is used over serial port or with Baldor's operator panel

MINT™ Making Motion Control Easy

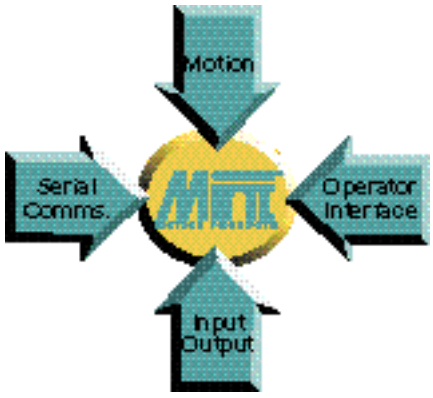
MINT™ is Baldor's motion control programming language. It is quick to learn and fast to execute, delivering maximum machine performance in the shortest time.

MINT can be used across Baldor's entire line of MINT motion control products, ranging from a single-axis SmartMove stand alone controller through to the eight axes NextMove PCI controller. Programs developed for one controller can quickly be transferred to others making MINT an ideal investment for OEMs and distributors who wish to re-use their software in a variety of applications.

Easy to Use and Powerful

MINT is similar to Basic in many ways and has been enhanced for real time machine control. Just like Basic, MINT is structured and very easy to use. Unlike Basic, MINT supports a wide range of control 'keywords' that are optimized for fast execution of complex motion functions. Simple, single keywords such as CAM and FOLLOW deliver sophisticated synchronized motion yet require little knowledge of motion control.

A single MINT program can control motion, I/O, communications, operator interface and error handling, making it the ideal choice for cost effective machine control.



'C' MINT

For applications requiring faster program execution speeds, a C motion library is available for the Nextmove PC and Nextmove BX controllers.

Features

Motion Control
- Speed, Position and Force control
- Linear and Circular interpolation
- Absolute & Relative moves
- Master input from encoder or pulse & direction
- Electronic gearbox, CAMs, flying shears
- Trapezoidal and 'S' shaped velocity profiles
- Five term servo control loop, with Proportional, Integral and Derivative gains, Velocity feedback, Velocity and Acceleration feedforward.

Input/Output
- Interrupt capability on inputs
- Error recovery routine for limit and positional errors
- Flexible operator control of an executing program using joy-stick, push buttons, or serial terminal
- Serial communications for RS232 & RS485 ports
- Multidrop RS485
- ANSI 3.28 communications protocol for secure machine control

Programming
- Fast tokenized interpreter with plain English keywords
- User defined variable names of up to ten characters in length
- User defined arrays for easy data storage
- Math and bitwide operators
- Automatic program execution on power up from non-volatile RAM
- On board editor
- Comprehensive program development tools for Windows 3.x/95/NT

Program Control Features

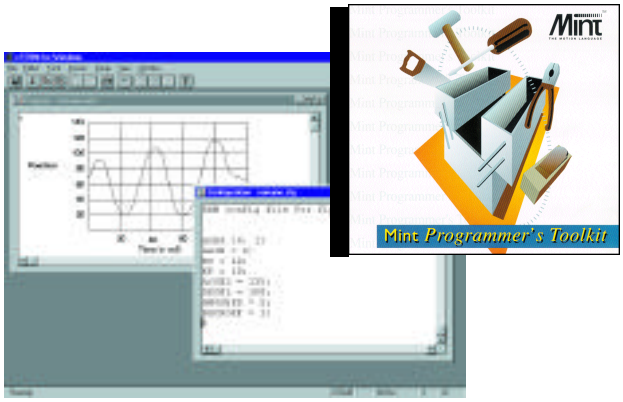
MINT™ supports the following Basic constructs:
- FOR.. NEXT
- PRINT
- INPUT
- INKEY
- IF .. THEN
- GOSUB label .. RETURN
- GOTO label

Additional constructs have been added to enhance program structure and applicability to motion control:
- Loop WHILE condition is true ENDW
- Block structured IF statements
- REPEAT loop UNTIL condition is true
- LOOP forever ENDL
- PAUSE until condition is true

Program Development Tools

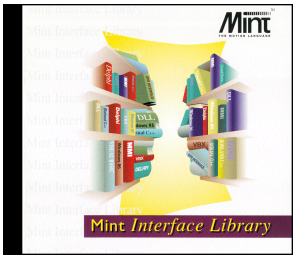
All MINT™ products are supplied with the MINT Programmers Toolkit, a comprehensive program development package for Microsoft Windows® 3.X/95/NT. The programmers toolkit provides a program editor, a software oscilloscope to aid system commissioning, file upload and download facilities, a communications debugger and terminal emulator.

Also included is a library of common application examples and some 'C' routines, including file upload/download to assist in the implementation of host computer communications.



MINT Interface Library

The MINT Interface Library provides a common Application Program Interface (API) for the complete range of MINT products. This allows applications running on a PC to easily access the functionality of MINT motion controllers. Communication is via the ISA bus for NextMove PC and via an RS232/485 serial interface for the other MINT controllers. The API is supplied in the form of dynamic link libraries (DLL) for Windows® 3.1/95/NT operating systems. A device driver is supplied for Windows NT®. Full C++ source code is also provided allowing the libraries to be compiled for use with other operating systems. Support for visual development environments such as Visual Basic, Visual C and Borland Delphi is included.



The MINT Interface Library also includes the complete set of MINT 'C' Functions in linkable format for developing embedded motion applications in 'C' which run directly on NextMove PC and NextMove BX platforms.

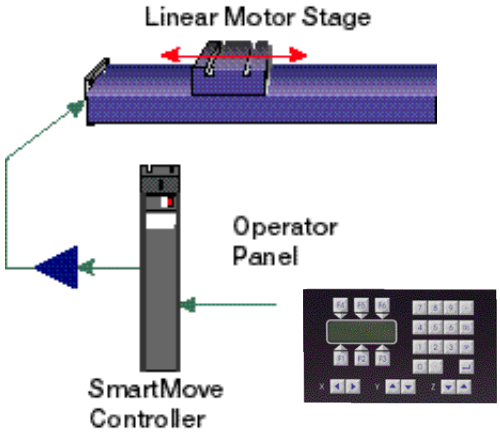
MINT Applications

The following examples illustrate how a MINT program can be used to solve a variety of applications.

Single-Axis Indexer

MINT can be used to position a single-axis system fast and accurately. Positions can be taught and replayed with ease, making this an ideal solution for many applications traditionally done mechanically.

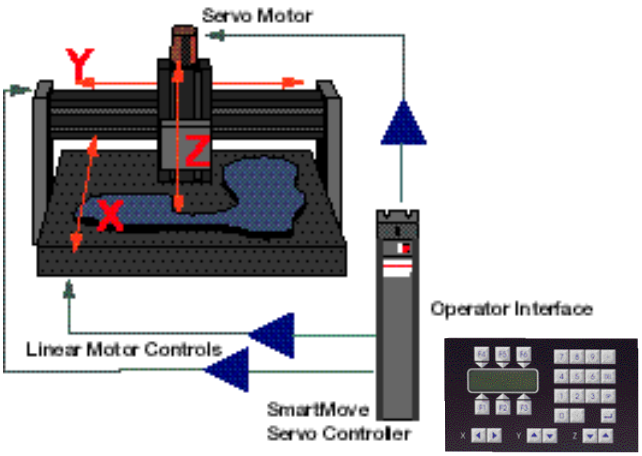
- Press feeders
- Packaging machine actuators
- Cut to length



Multi Axis Interpolated Moves.

MINT supports linear interpolation across eight axes and circular interpolation across two. Circular and linear moves can be blended together using the CONTOUR keyword to achieve a smooth continuous motion along a complex path. This is ideal for applications such as:

- Sign cutting
- Wood routing
- Glue laying



MINT™ Programming Language Keyword Summary

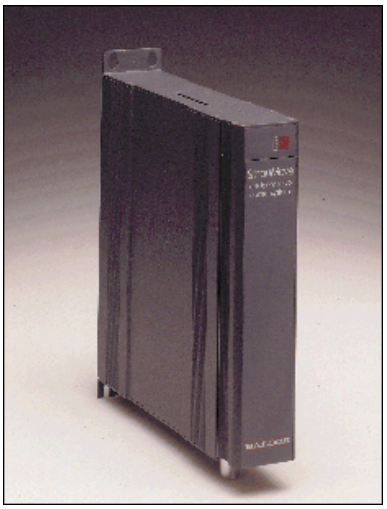
The main MINT™ keywords for SmartMove are summarized below:

Keyword	Description
Conditional statements	
IF.. THEN	BASIC IF
IF.. DO.. ELSE.. ENDIF	Block IF statement
PAUSE	wait until condition is true
Loops	
EXIT	terminate from loop structure
FOR.. TO.. NEXT	STEP optional
LOOP.. ENDL	loop forever
REPEAT.. UNTIL	loop UNTIL condition true
WHILE.. ENDW	loop WHILE condition true
Subroutines	
#INx	interrupt routine for input x (0 to 7)
#label	subroutine label
#ONERROR	error handling subroutine
#STOP	executed when stop input active
GOSUB label	branch to subroutine
RETURN	return from subroutine
Serial Character Input/Output	
BEEP	beep at the user terminal
BINARY	print expression as binary string
BOL	place cursor at beginning of line
CLS	clear screen (VT100 terminal)
INKEY	read a character from the serial port buffer
INPUT	numeric input with optional prompt
LOCATE	locate the cursor on a VT100 terminal
POFF	command line prompt off
PON	command line prompt on
PRINT/?	Print expression with BASIC ;, format
Motion commands	
ABORT/AB	abort motion - crash stop
ACCEL/AC	acceleration
BOOSTOFF/BF	boost output off
BOOSTON/BO	stepper boost output on
CIRCLEA/CA	absolute circular interpolation
CIRCLER/CR	relative circular interpolation
CONTOFF/CO	contouring off
CONTON/CT	contouring on
FOLLOW/FL	software gearbox
GO	begin motion
FLY	Flying Shear

Keyword	Description
CAM	electronic CAM
FOLLOW	master slave follow
GEARN	gear ratio numerator
GEARD	gear ratio denominator
JOG/JG	speed control
MOVEA/MA	positional move absolute
MOVER/MR	positional move relative
OFFSET/OF	positional move during following
PULSE/PU	pulse following mode
RAMP/RP	ramp smooth factor
SPEED/SP	speed for positional move
STOP/ST	controlled stop
TORQUE/TQ	torque control
VECTORA/VA	absolute linear interpolation
VECTORR/VR	relative linear interpolation
Initialization	
CANCEL/CN	cancel error, retain position
CONFIG/CF	configure axis for servo/stepper/off
CURRLIMIT/CL	set max DAC output
DISLIMIT/DL	disable limits switches
ENLIMIT/EL	enable limit switches
GAIN/GN	position loop proportional gain
HMSPEED/HS	speed to seek home switch
HOME/HM	find home position, read home switch
KINT/KI	position loop integral gain
KINTRANGE/KR	position loop integration limit
KVEL/KV	velocity loop feedback gain
KVELFF/KF	velocity loop feedforward gain
MFOLERR/MF	maximum following error
RESET/RE	initialize variables
SCALE/SF	scale factor for encoder counts
SERVOC/SC	servo to current position
SERVOFF/SO	servo power off
SERVON/SV	servo power on
ZERO/ZR	set present position to 0
Diagnostics	
DEMAND/DM	motor demand
ERROR/ER	axis error condition
FOLERR/FE	following error
IDLE/ID	true when axis is idle
LED/LD	controls LED display
MODE/MD	current mode of motion
POS/PS	axis position
VEL/VL	axis velocity

Keyword	Description
Control Input/Output	
ANALOGUEx/Ax	analog inputs (1 … n)
DAC/DC	write to DAC outputs
FREQ/FQ	square wave (Hz) on pulse output
IN	8 bit binary value of inputs
INx/Ix	User inputs (0 to 7)
LIMIT/LM	read limit switch
OUT/OT	write binary to outputs
OUTx/Ox	user outputs (0 to 7)
PEEK	read data from option board
POKE	write data to option board
STOPSW/SS	read value of stop switch
TIMER/TI	read pulse follower counter
WRAP/WR	set reset value for pulse input
XIO	expanded 24 I/O on option board
REMOTE IN	read CANbus remote input
REMOTE OUT	write data to CANbus remote output
User Variables	
DISPLAY	lists all defined variables
DIM	reserve space for array
RELEASE	clears all variables
Commands	
:	separates statements
AUTO	auto-execute on power-up
END	ends program execution
GOTO	jump to label
REM	remark
RUN	run program
TROFF	trace program execution off
TRON	trace program execution on
WAIT/WT	wait in milliseconds
Mathematical Operators and Numbers	
*,+,-,/,%	math operations
<,>,<=,>=,<>,=	comparison operations
ABS	return absolute value
AND/&	logical and bitwise AND operation
INT	return integer part
NOT/!	logical not
OR/!	logical and bitwise OR operation

Keyword	Description
Editor and File commands	
CON	select configuration file for editing
DEL	delete a range of lines
EDIT	edit or append a line
FREE	return free memory in buffer
INS	insert lines into file
LIST	list a range of lines
LOAD	load a file from the host
NEW	clear a file from memory
PROG	select program file for editing
RUN	execute the program
SAVE	save a file to the host



SmartMove – 1, 2, 3 Axis Motion Controller

- 1, 2 or 3 axis of vector/servo control
- 2mS update time for all three axes
- CE compliant box construction
- RS232 or RS485 communications port
- Digital & analog I/O
- MINT™ programming language
- CANbus port for distributed I/O and operator interface
- Multi axis interpolation, gearing, CAMs and much more.
- Pulse and direction inputs
- Status display for rapid setup and diagnostics
- Non volatile program and data storage
- Memory card for off-line program/data storage

Programmable Functions

SmartMove is programmed in Baldor's easy to use MINT language. MINT supports a wide range of motion and control functions outlined below and described more fully in the beginning of this section.

Positional Moves

Absolute & Relative move types allow high speed point to point motion on one or all axes.

Speed, Acceleration & Deceleration can be defined for each move type.

Trapezoidal profiled moves provide the fastest point to point move but exert the maximum jerk and shock on a system.

S-ramp profiled moves provide a more smooth velocity profile that prolongs the life of machine mechanics.

Contouring allows a stream of point to point moves to be blended together into a continuous and smooth motion.

Interpolated Moves

Linear Interpolation across two or three axes allows positional moves to be defined in terms of a linear X, Y, Z vector.

Circular Interpolation across the first two axes allow a complete or partial arc to be defined.

Contouring allows a string of linear and circular interpolated moves to be blended together into a continuous complex path of motion.

Master/Follower

Electronic Cam replaces the traditional mechanical cam with a servo motor and software programmable cam profile. SmartMove supports one cam profile for the first two axes.

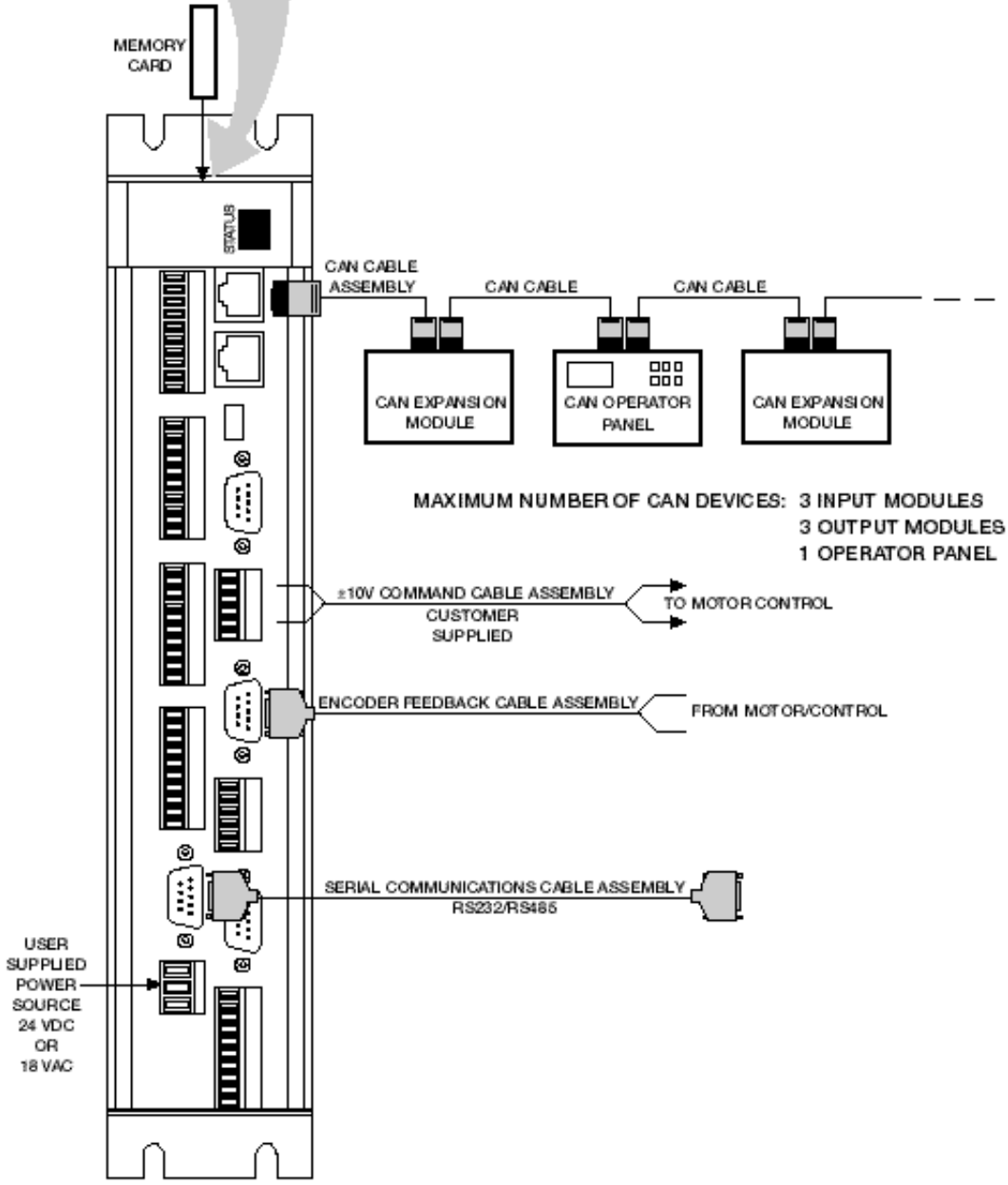
Electronic Gearbox & Clutch enables two motor shafts to be linked together in precise synchronization with a software programmable gear ratio. SmartMove allows any axis to be geared to any other axis or to the Pulse and Direction inputs.

Flying Shear allows operations to be performed at regular intervals on a continuously moving web. Acceleration, synchronization and return stroke are linked by software to the movement of the product.

SmartMove

SmartMove integrates the key functions of motion controller into a single, easy to program, stand alone package. Multi-axis motion control, I/O handling, serial communications, machine level networking and optional operator panel work together under the control of a single MINT™ application program.

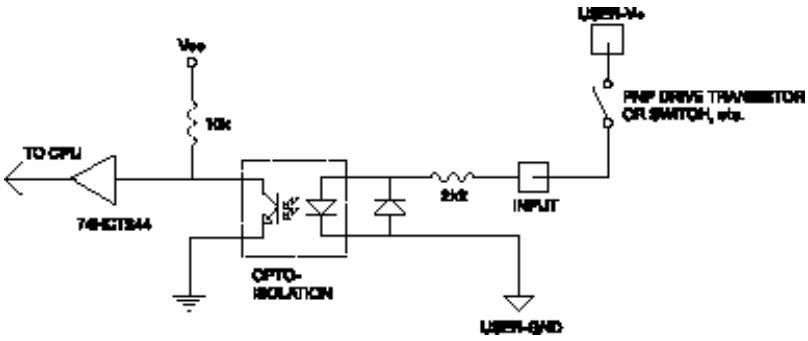
SmartMove connects directly to Baldor's vector and servo drives. Cable assemblies are available for feedback between the SmartMove and motor control, making connections reliable and easy.



Typical Connections

① ISOLATED & PROTECTED INPUTS

All the Inputs listed below are PNP, opto-isolated and reverse bias protected. This means that if the input is accidentally connected to a negative voltage (e.g. -24V) no damage will be caused. Inputs are active in the range 12V to 24V and inactive 0V to 2V. The input buffer circuit is shown below.



② PULSE & DIRECTION INPUT

Used as Master input to CAM, gearbox and follow functions.
PULSE train input, maximum input frequency of 50kHz.
DIRECTION of count
RESET pulse counter

③ STOP INPUT

One input per controller.
Brings all axes to a controlled stop when active.

④ FAST POSITION CAPTURE INPUT

One per controller
Captures position of all axes within 30µS.

⑤ DRIVE ERROR INPUT

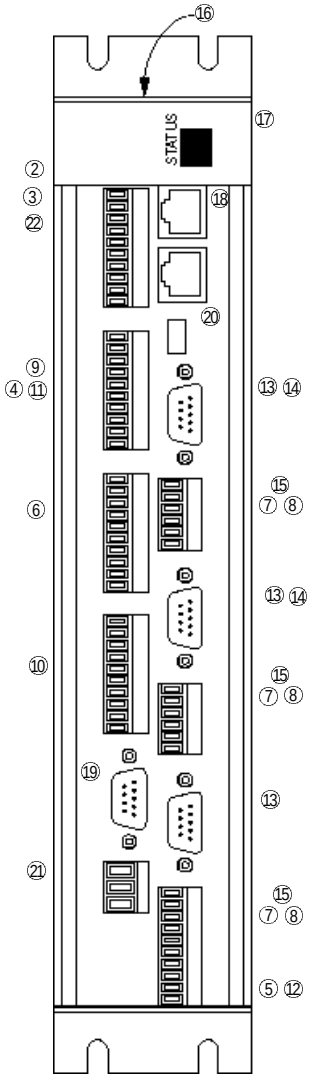
One per controller
Brings all axes to a crash stop when active.
Input polarity is software configurable.

⑥ USER DIGITAL INPUTS

8 digital inputs
May be configured to interrupt user program and call subroutine.

⑦ HOME INPUT

One per axis
Provides reference position for the axis.
Three modes of homing: on encoder index, on switch, on both.



⑧ LIMIT

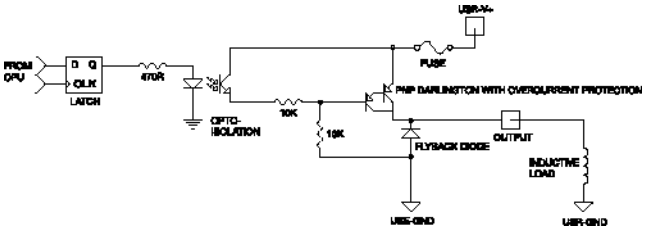
One per axis
Provides end of travel protection.
Crash stop all axes when active.

⑨ ANALOG INPUTS

3 independent analog channels.
10 bit resolution.
Jumper selectable for 10V (differential) or 0-5V (single ended) operation.

⑩ USER DIGITAL OUTPUTS

8 digital outputs.
Opto-isolated, PNP, 12-24V
Over-current and over-temperature protected.
Errors can be flagged to MINT program.
50mA continuous source on all channels.
350mA max source per channel,
500mA max for all 8 channels.



⑪ SPARE ANALOG OUTPUT

Additional analog output for system tuning or general use.
±10V, 12 bit resolution output.

⑫ DRIVE ENABLE RELAY

One per controller.
Form C (SPDT) relay rated at 1A @ 24V.
Common, normally open, normally closed contacts.
Fail safe operation: relay de-energized on an error.

⑬ FEEDBACK ENCODER

One per axis.
Incremental encoder for position feedback.
4.6MHz quadrature.
Operates with both single ended (TTL or open collector) or differential (TTL or RS422) output type.

⑭ MASTER ENCODER

Available only on one and two axis models
See Pulse & Direction input for three axis possibilities
4.6 MHz quadrature.
Used for following applications.

⑮ AMPLIFIER ANALOG COMMAND OUTPUT

One per axis.
± 10V, 12 bit resolution command output

⑯ MEMORY CARD

64K or 128K memory card.
Used for memory expansion or for loading programs on power up of controller.
May be used to store data points and/or program.

⑰ STATUS DISPLAY

Seven segment display indicates operating mode and fault conditions.
Useful in set up and field diagnostics.

⑱ CANbus Port

1 Mbit/second CANbus serial link.
Connection to Baldor I/O modules - 3x8 inputs, 3x8 outputs
Connection to Baldor operator panel.

⑲ SERIAL PORT

RS232 or full duplex 4 wire RS485.
(Specified at time of order.)
Used for programming & general communication.
RS485 supports up to 16 multi-dropped SmartMove controllers.
9600 baud (software selectable), 1 start bit, 8 data bits, 1 stop bit, no parity.
9-pin male D-type connector.

⑳ ADDRESS SWITCH

Used to assign address of SmartMove when connected to RS485 multi drop line.
Four DIP toggle switches give 16 unique addresses.

㉑ POWER SUPPLY INPUT

A single input is used to power the SmartMove
24VDC @ 2.6A or 18VAC @ 150VA

㉒ INTERNAL POWER SUPPLY

An internal switched mode power supply generates the following from the single power input:
Stabilized +5V output at 500mA for encoders.
Stabilized +12V outputs at 200mA for analog inputs.
Can be used to power potentiometers for the analog inputs.
24V output for user I/O.

Communications

RS232/RS485 port supports the industry standard full duplex ASCII protocol. This allows easy connection to almost any device with a serial port.

Multi-drop allows up to 16 SmartMove controllers to be linked together on an RS485 network.

Comms Arrays provide an efficient way to transfer data bidirectionally between a MINT™ program running on SmartMove and a separate user program running on the host controller. Comms arrays give the serial port the same functionality as a parallel dual port ram.

CANbus is used to communicate to Baldor's remote I/O block and operator keypad.

Input/Output

Eight User Inputs are read independently or as a single byte of information. All user inputs may be configured to generate an interrupt to the MINT program.

Eight User Outputs can be written to independently, or as a single byte of information. All user outputs are over- current protected and a fault condition will generate an ERROR command to the MINT program.

Three Analog Inputs can be read as independent 10 bit values.

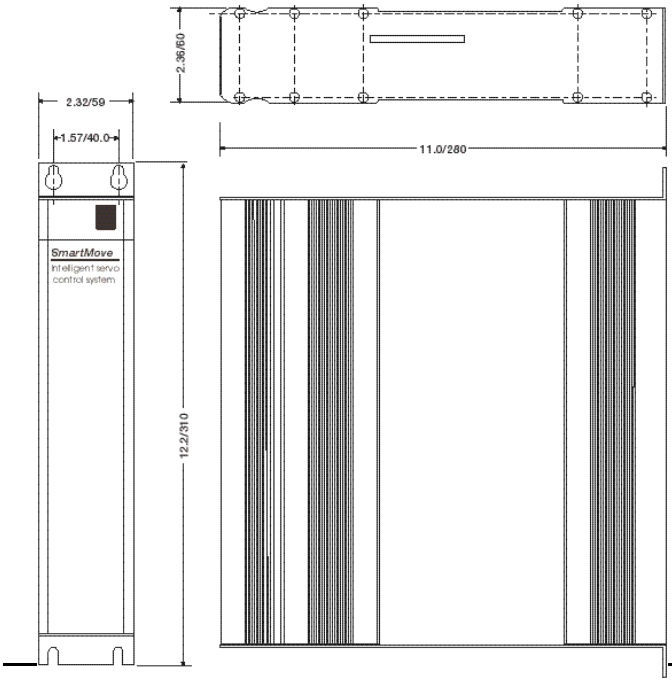
Remote I/O is connected to the CANbus port and is simply read from, and written to, using MINT.

SmartMove Catalog Numbers

Number of Axes	Serial Comm Port	MINT Language	Catalog Number[1]
1	RS232	Process MINT	SMM001-550
	RS485	Process MINT	SMM001-553
2	RS232	Process MINT	SMM001-551
		Interpolation MINT[2]	SMM001-555
	RS485	Process MINT	SMM001-557
		Interpolation MINT[2]	SMM001-556
3	RS232	Process MINT	SMM001-552
		Interpolation MINT[2]	SMM001-558
	RS485	Process MINT	SMM001-554
		Interpolation MINT[2]	SMM001-559

[1] Use with Baldor CAN Operator Panel
[2] Interpolation MINT performs circular interpolation and all functions of "process MINT" except camming functions.

Dimensions (inches/millimeters)



Technical Data

Description	Unit	Specifications
Input Voltage	VDC or	24 (2.6A) or
	VAC	18 (150VA)
Operating Temperature	°F	32 to 115
	°C	0 to +45
Weight	lbs.	6.3
	Kg.	2.86

Accessories for SmartMove

CANbus Accessories

SmartMove features one CANbus port for connecting to Baldor's I/O modules and operator panel. These accessories offer connection simplicity and a fast and reliable method of expanding the I/O capabilities of the SmartMove.

CANbus is a high integrity, two wire serial link that transfers data at rates up to 1M bit/second over a distance of 130ft/40m. (3200ft/1000m at 50Kbit/second). With just a twisted pair, machine wiring costs, material and installation can be greatly reduced. At the same time, the reduced number of wires can provide, greater machine reliability.

SmartMove supports the following CANbus accessories.

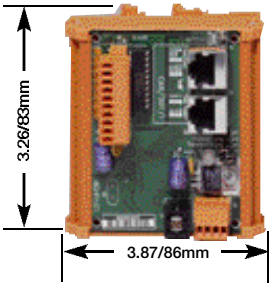
8 digital input modules	Maximum of three.
8 digital output modules	Maximum of three.
8 relay output modules	(Any output type)
Operator panel:	Maximum of one.

Wiring & Mechanical

Each CANbus module has two CANbus connectors which are electrically identical. This allows several modules to be 'daisy chained' using Baldor's point to point cable assemblies. I/O modules can be DIN rail mounted for easy installation.

MINT™ keywords used with CANbus accessories include. REMOTEIN (RI) and REMOTEOUT (RO).

8 Input Module

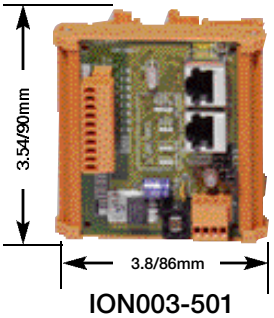


ION001-501

- 8 digital inputs.
- Maximum 3 input modules per SmartMove.
- Opto isolated and may be connected to positive or negative common (for use with NPN and PNP output transistors).
- Inputs are guaranteed to be active in the range ± 12V to ± 24V and inactive between ±2V.
- LEDs indicate status of each input.
- Read from MINT program using REMOTEIN keyword.
- Two part connectors for power and inputs.
- Power requirements: +12 to +24VDC, 45mA to 90mA respectively.

8 PNP Output Module

- 8 digital outputs.
- Maximum 3 output (PNP or Relay) modules per SmartMove.
- Opto isolated and protected against over-current and over- temperature.
- 50mA continuous source on all channels.
- 350mA max source on single channel simultaneously.
- 500mA max total output for all 8 channels.
- LEDs indicate status of each output.
- Activated from MINT program using REMOTEOUT keyword.

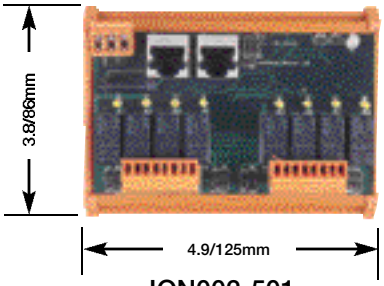


ION003-501

- Two part connectors for power and outputs.
- Power requirements: +12 to +24VDC, 110mA to 130mA respectively.

8 Relay Output Module

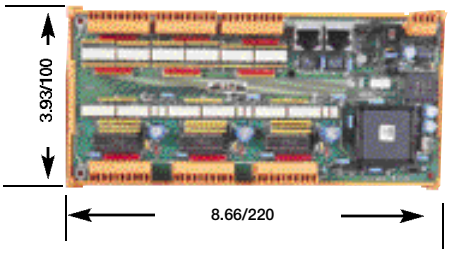
- 8 relay outputs.
- Maximum 3 output (relay or PNP) modules per SmartMove.
- Form C (SPDT) relays rated at 125 VAC, (0.5A) 30 VDC, (2A).
- LEDs indicate status of each output.
- Activated from MINT program using REMOTEOUT keyword.
- Two part connectors for power and outputs.
- Power requirements: +24VDC, 215mA.



ION002-501

24 Input, 24 Output Module

- 24 outputs are opto isolated and protected against over-current and over-temperature.
- 50mA continuous source on all channels.
- 350mA max source on all channels.
- 500mA max total output for all 8 channels.
- 24 inputs are opto isolated and may be connected to positive or negative common (for use with NPN and PNP output transistors).
- Inputs are guaranteed to be active in the range ±12V to ±24V and inactive between ±2V.
- Power requirements: Voltage range: 12-30V, Current range, 12V (369mA) & 24V (267mA) all inputs and outputs on.



ION004-501

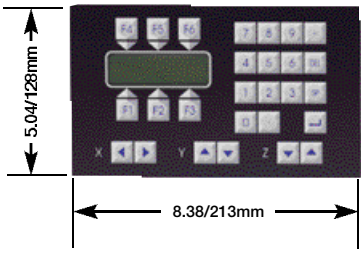
Operator Panel - CAN Bus

SmartMove supports a full featured operator panel that connects directly into the CANbus expansion port. The panel provides a cost effective and flexible means for inputting and displaying operator information.

MINT™ provides a powerful set of functions for reading from and writing to the panel, allowing a variety of operator interface types to be configured. INPUT waits for a number to be entered, INKEY reads the next key in the serial buffer and READKEY reads the key currently being pressed. CLS clears the screen and LOCATE locates the cursor at a specified location. Function key F1 through F6 are designed to support menu driven applications.

Specifications:

- 20 character by 4 line backlit LCD display.
- 27 keys, X, Y, Z cursor keys, numeric keypad and 6 user definable function keys.
- Tactile feedback on all keys.
- Audible buzzer controlled from software BEEP command.
- Connected to SmartMove controller via CANbus.
- Maximum cable -500m, shielded twisted pair.
- Power supply: +15 to 24V, 135mA.
- 19" rack compatible – 3U by 42HP.
- Four screw studs mounted on rear of panel provide secure mounting to any flat panels.



Memory Card

- A non-volatile, “PCMCIA style” memory card that plugs into the top of the SmartMove controller.
- Available in 128kbyte sizes.
- Allows the program and configuration files to be stored independent of the controller memory.
- Allows for downloading of programs and configuration data without the need to connect a computer.
- Allows array data to be expanded by storing the arrays on the card, not in the controller’s memory.
- Specifying the /MX option allows for the program and configuration files to be permanently stored on the card, leaving the controller memory free for compiled code and array data. The /MX option also allows larger programs to be written than can be normally supported in the standard onboard RAM.
- Please consult the factory for the correct part number of SmartMove with the /MX option.

MINT Options

SmartMove is offered with three different ‘flavors’ of MINT to cover the widest range of machine control applications.

Process MINT - Standard

Process MINT is shipped as standard in all SmartMove controllers.
Process MINT does NOT support circular interpolation. See Interpolation MINT.

Features of Process MINT include:

- Simple point to point moves with optional contouring between multiple moves.
- Trapezoidal or ‘S’ ramp velocity profiles.
- Three axis linear interpolation.
- Master/Slave operation with precision software gearbox and software CAMs.
- Flying shears.
- Program interrupts on user digital inputs.
- Comprehensive terminal I/O facilities.
- Automatic program execution on power up. (Program selected)
- COMMS Arrays: 99 read/write memory locations for asynchronous communications between MINT program and PLC or PC host program.
- User named variables and subroutines make programs easy to develop and maintain.

Interpolation MINT

- Circular interpolation across first two axes. Interpolation MINT does not support aster/Follower features such as gearbox, cams or flying shears. See Process MINT.

MINT/3.28

This version of software is intended for systems where the SmartMove controller simply responds to commands sent down from a host computer. Ideal for industrial automation, the communications protocol (based on ANSI 3.28) provides fault tolerant communications for up to 16 controllers on one RS485 multi-drop link.

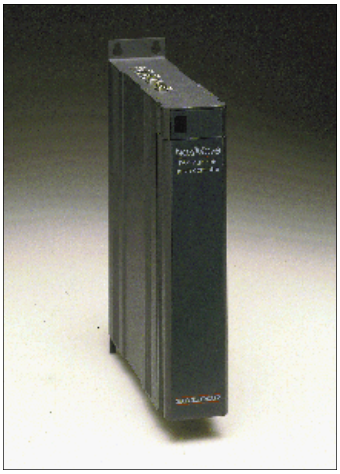
- Protected ASCII communications protocol for host controlled systems based on ANSI 3.28.
- SmartMove controller supplied with library of COMMS routines for host PC.
- Up to 16 controllers (48 axes maximum) on one RS485 multi-drop link.

SmartMove Accessories

Description	Cable Assembly Catalog Number	Length	
		Meters	Feet
CAN Cables	CBL004-501	0.25	0.8
	CBL004-502	0.50	1.6
	CBL004-503	1	3.2
	CBL004-504	2	6.5
	CBL004-505	3	9.8
	CBL004-506	5	16.3
	CBL004-507	10	32.7
	CBL004-508	25	81.8
Feedback Cables for use with 18H	CBL010MF-A	1	3.2
	CBL020MF-A	2	6.5
	CBL100MF-B	10	32.7
	CBL200MF-B	20	65.4
Serial Communication	CBL001-501	3	9.8
Ribbon Cables	CBL007-501	0.15	0.5
	CBL008-504	0.30	0.9
	CBL008-501	1.50	4.9
	CBL008-503	2	6.5

CAN Expansion Modules	Catalog Number
CAN 8 Digital Inputs	ION001-501
CAN 8 Digital Outputs	ION003-501
CAN 8 Relay Outputs	ION002-501
CAN 24 Inputs, 24 Outputs	ION004-501

Miscellaneous	Catalog Number
CAN Operator Panel	KPD002-501
128K Memory Card	OPT005-501
MINT Interface Library	MNT001-501
Ribbon Operator Panel	KPD001-501



NextMove BX Motion Controller 2, 3, 4 Axis

- 2 to 4 axis vector/servo control
- Fast 32 bit floating point DSP delivers 250µS update time for 4 servos
- CE compliant box construction
- RS232 and RS485 serial ports
- Digital and analog I/O
- MINT™ or 'C' programming
- CANbus port for distributed I/O and operator interface
- Multi axis interpolation across four axes
- Gearing, CAMs, flying shears and much more
- 512k RAM and 512k Flash for program and data storage
- One 25µS position capture input
- Three 1mS position capture inputs

Programmable Functions

NextMove BX is programmed in Baldor's easy to use MINT language, or in "C". Both the MINT programming language and C function libraries support a wide range of motion and control functions outlined below and described more fully the beginning of this section.

Positional Moves

Absolute & Relative move types allow high speed point to point motion on one or all axes.

Speed, Acceleration & Deceleration can be defined for each move type.

Trapezoidal profiled moves provide the fastest point to point move but exert the maximum jerk and shock on a system.

S-ramp profiled moves provide a more smooth velocity profile that prolongs the life of machine mechanics.

Contouring allows a stream of point to point moves to be blended together into a continuous and smooth motion for one or more axes.

Splining allows a stream of moves, defined in terms of position, velocity and time, to be blended together into a continuous and smooth motion. Used in applications where path speed and continuous velocity are important.

Interpolated Moves

Linear Interpolation across two to four axes allows position moves to be defined in terms of a linear vectors. Absolute and relative vectored moves are supported.

Circular Interpolation across any pairs of axes allows a complete or partial arc to be defined. Absolute and relative circular moves are supported.

Contouring allows a string of linear and circular interpolated moves to be blended together into a continuous complex path of motion.

Master/Follower

Electronic Cam replaces the traditional mechanical cam with a vector/servo motor and software programmable cam profile. NextMove BX supports one cam profile for each of the four axis. Any axis may be defined as a Master input to a cam and multiple Master/cam relationships are supported. There is a fifth encoder input for an external Master encoder.

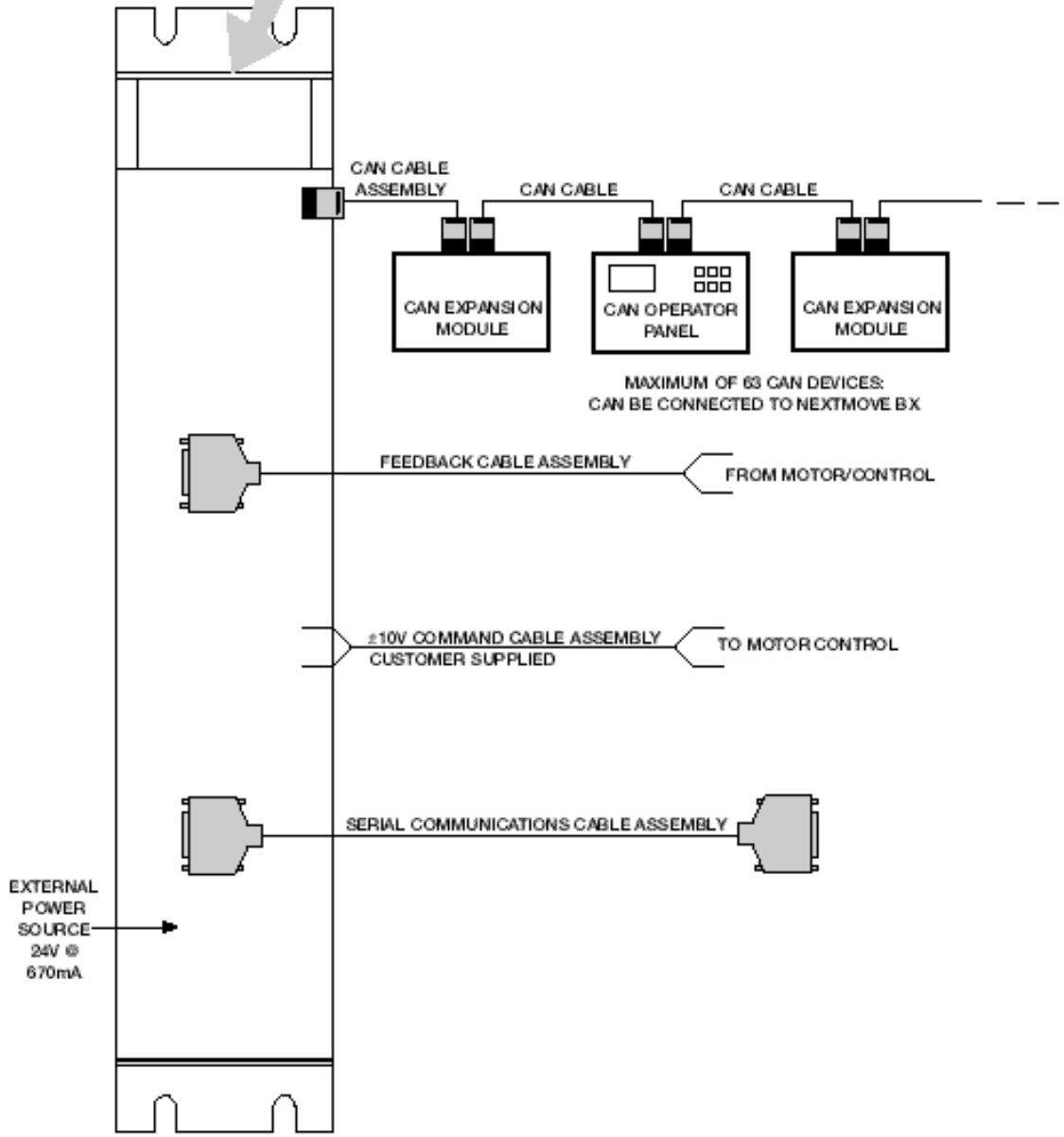
Electronic Gearbox & Clutch enable two motor shafts to be linked together in precise synchronization with a software programmable gear ratio. NextMove BX allows any axis to be geared to any Master. Any axis may be defined as the Master and multiple Master/gear relationships are supported

Flying Shear allows operations to be performed at regular intervals on a continuously moving web. Acceleration, synchronization and return stroke are linked by software to the movement of the product.

NextMove BX

NextMove BX provides 32 bit floating point DSP power to all four axes, features digital and analog I/O for use in the most demanding processes and applications, and works with CAN based I/O and MMI. Unlike fixed-point DSP controllers, NextMove BX deals accurately with real-world problems in real time. There is a master encoder input for software gearbox, cam and shear applications.

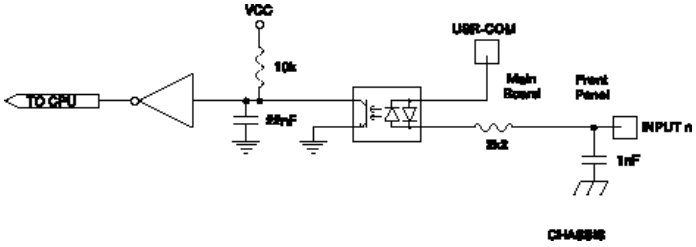
NextMove BX connects directly to Baldor's vector and servo controls. Cable assemblies are available for feedback between the NextMove BX and control, making connections reliable and easy.

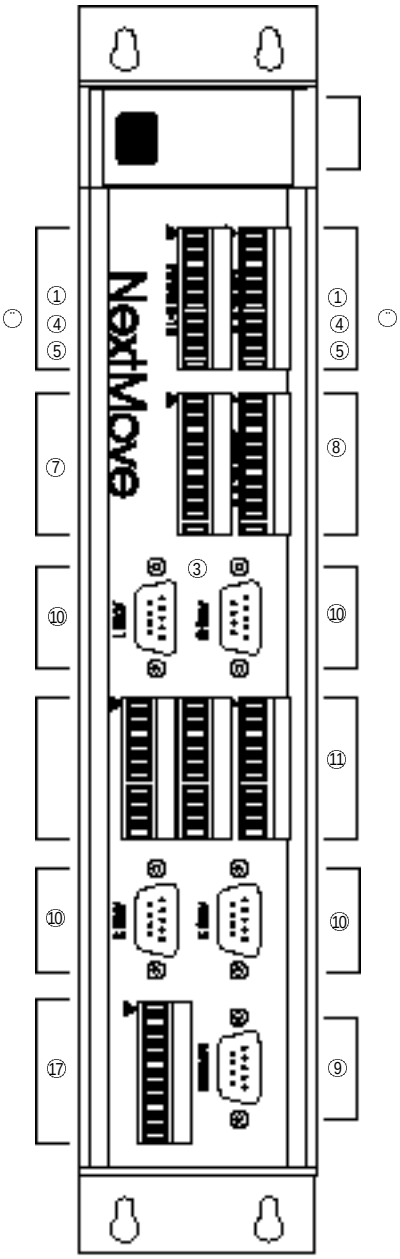


Typical Connections

① **DIGITAL INPUTS**
16 digital inputs, user configured for limit, home, stop, error or general purpose.
May be configured as level or edge triggered, and to interrupt a user program and call a subroutine.

② **INPUT CHARACTERISTICS**
Opto-isolated and may be connected to positive or negative common (for use with NPN and PNP output transistors).





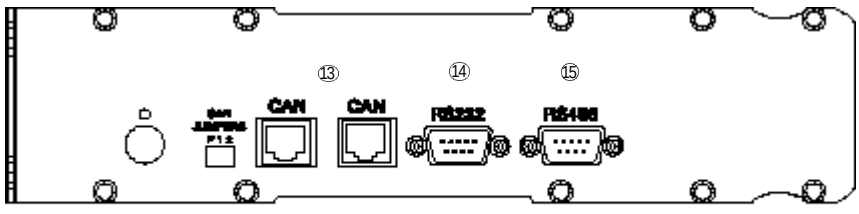
③ **FAST POSITION CAPTURE**
One of the 4 FASTPOS inputs will latch selected axis position data within 25µS. The remaining 3 FASTPOS inputs latch data within 1ms.

④ **HOME**
One per axis, taken from the 16 digital inputs.
Provides reference position for the axis.
Three modes of homing: on encoder index, on switch, on both.

⑤ **LIMIT**
One or two per axis, taken from the 16 digital inputs.
Provides end of travel protection. Crash stop assigned axes when active.

⑥ **DRIVE ERROR INPUT**
Usually one per controller, taken from the 16 digital inputs. Brings all axes to a crash stop when active.
Input sense software configurable.

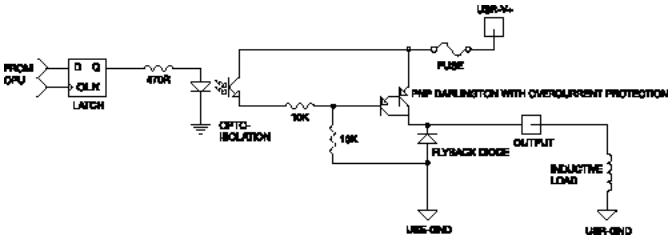
⑦ **ANALOG INPUTS**
8 x 12 bit resolution single ended inputs or
4 x 12 bit resolution, differential inputs.
±10V, ±5V, 0-10V or 0-5V voltage ranges can be set by the user.



Top Plate Connectors

⑧ DIGITAL OUTPUTS

8 digital outputs, any of which may be user configured for drive enable, error output, or general purpose.
Opto-isolated, 12-24V.
Over-current and over-temperature protection.
Errors can be flagged to MINT™ program.
50mA continuous source on all channels.
350mA max source per channel,
500mA max for all 8 channels.



⑨ MASTER ENCODER

One per controller.
8MHz quadrature counts.
Used for following applications

⑩ FEEDBACK ENCODER

One per axis
Incremental encoder for position feedback
Operates differential (TTL or RS 422) output type.
Accepts three channel encoders (A, B and Z).
A and B channels are quadrature decoded.
Maximum encoder frequency:
8MHz quadrature counts.

⑪ AMPLIFIER ANALOG COMMAND OUTPUT

One per axis up to a maximum of four
± 10V, 14bit command output.

⑫ MEMORY

512K, expandable to 4Mbytes, of battery backed RAM is provided for data storage and program execution. 512K, expandable to 2Mbyte, of Flash.

⑬ CANbus PORT

Two channels of IMbit/second CANbus.
Connection to Baldor I/O modules.
Connection to Baldor operator panel.
63 CAN devices may be connected in total.

⑭ RS232 PORT

Used for programming and general communication.

⑮ RS485 PORT

Used for programming and general communication.
19200 maximum baud rate.
Supports up to 32 multi-dropped NextMove BX controllers.

⑯ DRIVE ENABLE RELAY

One per controller.
Form C (SPDT) relay rated at 24V (150 mA).
Common, normally open, normally closed.
Fail safe operation: relay de-energized on an error.

⑰ POWER REQUIREMENTS

A single input is used to power the NextMove BX
+24V at 670mA.
External power for opto-isolated outputs: up to 850mA @ 12-24V.

Input/Output

16 Inputs are level or edge triggered and can be user configured as limit, home, stop, error, or general purpose inputs. General purpose inputs may be configured to interrupt the MINT™ or C program and call a service routine.

8 Outputs are user configured as drive enable, error output or general purpose outputs. All user outputs are over current protected and a fault condition will generate and ERROR to the MINT or C program.

Analog Inputs can be read as 8 x 12 bit values (single ended input) or 4 x 12 bit values, (differential input).

Remote I/O is connected to the CANbus port and is simply read from, and written to, using MINT or 'C' functions.

Communications

RS232 port supports the industry standard full duplex ASCII protocol. This allows easy connection to almost any device with a serial port.

RS485 port allows up to 16 NextMove BX controllers to be linked together on a single RS485 multi-drop.

COMMS Array provide an efficient way to transfer data bidirectionally between a MINT program running on NextMove BX and a separate user program running on the host controller. COMMS array gives the serial port the same functionality as a parallel dual port ram.

CANbus is used to communicate to Baldor's remote I/O blocks and operator keypad.

Programming Options

MINT is the easiest and quickest way to program the NextMove BX controller. MINT programs are developed using the MINT Programmers toolkit which is supplied as standard with every NextMove product.

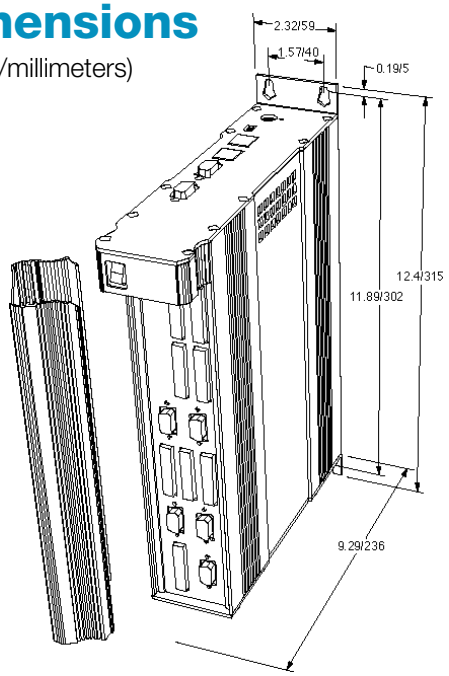
'C' Function Libraries'. Programs written in 'C' will typically run faster than MINT programs but they require a good working knowledge of 'C'. 'C' code must be complied to run on the TMS320C31 processor inside the NextMove BX. 'C' does not support interrupts on inputs. The 'C' functions are contained in Baldor's MINT Interface Library CD product, and the TMS320C31 cross complier is available from Texas Instruments.

NextMove BX Catalog Numbers

Number of Axes	Catalog Number
2	NMX001-501
3	NMX001-502
4	NMX001-503

Dimensions

(inches/millimeters)



Technical Data

Description	Unit	Specifications
Input Voltage	VDC	+24 (670 mA)
External Power for opto-isolated outputs	VDC	12-24 (up to 850mA)
Operating Temperature	°F	32 to 113
	°C	0 to +45
Weight	lbs.	0.671
	g.	305

Accessories for NextMove BX

CANbus Accessories

NextMove BX features two CANbus ports. One is used for connecting to Baldor's I/O modules and operator panel (the second is reserved for future designs). These accessories offer connection simplicity and a fast and reliable method of expanding the capabilities of the NextMove BX.

CANbus is a high integrity, two wire serial link that transfers data at rates up to 1M bit/second over a distance of 130ft/40m. (3200ft/1000m at 50Kbit/second). With just a twisted pair, machine wiring costs, material and installation, can be greatly reduced. At the same time, the reduced number of wires can provide greater machine reliability.

NextMove BX supports the following CANbus accessories.

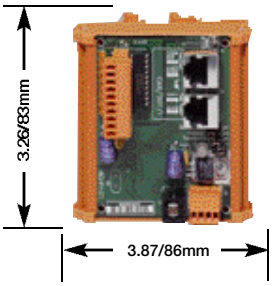
8 digital input modules
8 digital output modules
8 relay output modules
24 input, 24 output modules
Operator panels (maximum of 4)

A maximum of 63 CANbus accessories may be connected to NextMove BX

Wiring & Mechanical

Each CANbus accessory has two CANbus connectors which are electrically identical. This allows several modules to be 'daisy chained' using Baldor's point to point cable assemblies. I/O modules can be DIN rail mounted for easy installation.

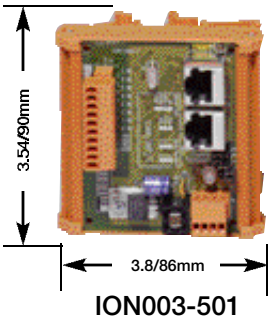
8 Input Module



ION001-501

- 8 digital inputs.
- Opto isolated and may be connected to positive or negative common (for use with NPN and PNP output transistors).
- Inputs are guaranteed to be active in the range ± 12V to ± 24V and inactive between ±2V.
- LEDs indicate status of each input.
- Read from MINT™ program using REMOTEIN keyword.
- Two part connectors for power and inputs.
- Power requirements: +12 to +24VDC, 45mA to 90mA respectively.

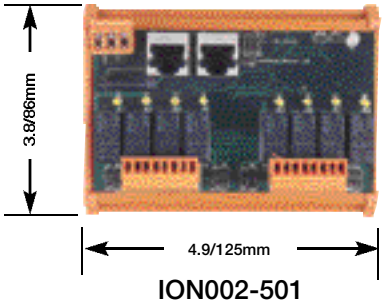
8 PNP Output Module



ION003-501

- 8 digital inputs.
- Opto isolated an protected against over current and over temperature.
- 50mA continuous source on all channels.
- 350mA max source on single channel.
- 500mA max total output for all 8 channels on simultaneously.
- LEDs indicate status of each output.
- Activated from MINT program using REMOTEOUT keyword.
- Two part connectors for power and outputs.
- Power requirements: +12 to +24VDC, 110mA to 130mA respectively.

8 Relay Output Module

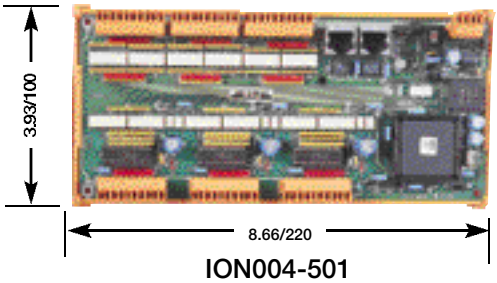


ION002-501

- 8 relay outputs.
- FORM C (SPDT) Relays rated at 0.5A @ 125 VAC, 2A @ 30 VDC.
- LEDs indicate status of each output.
- Activated from MINT program using REMOTEOUT keyword.
- Two part connectors for power and outputs.
- Power requirements: +24VDC, 215mA.

24 Input, 24 Output Module

- 24 outputs are opto isolated and protected against over current and over temperature.
- 50mA continuous source on all channels.
- 350mA max source on all channels.
- 500mA max total output for all 8 channels.
- 24 inputs are opto isolated and may be connected to positive or negative common (for use with NPN and PNP output transistors).
- Inputs are guaranteed to be active in the range ±12V to ±24V and inactive between ±2V.
- Power requirements: Voltage range: 12-30V, Current range, 369mA@12V & 267mA@24V all inputs and outputs on.



ION004-501

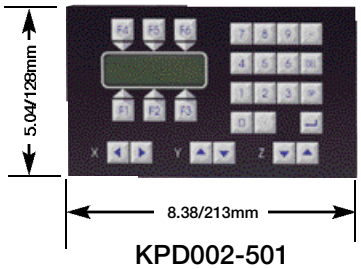
Operator Panel - CAN Bus

Baldor's full featured operator panel connects to the CANbus port of the NextMove BX. The panel provides a cost effective and flexible means for inputting and displaying operator information.

MINT™ provides a powerful set of functions for reading from and writing to the panel, allowing a variety of operator interface types to be developed. INPUT waits for a number to be entered, INKEY reads the next key in the serial buffer and READKEY reads the key currently being pressed. CLS clears the screen and LOCATE locates the cursor at a specified location. Function keys are designed to support menu driven applications.

Specifications:

- 20 character by 4 line backlit LCD display.
- 3 axes model: total of 27 keys, X, Y, Z cursor keys, numeric keypad and 6 user definable function keys.
- 4 axes model: total of 41 keys, axis 1, 2, 3, 4, cursor keys, numeric keypad and 18 user definable function keys
- Tactile feedback on all keys.
- Audible buzzer controlled from software BEEP command.
- Connected to NextMove BX controller via CAN.
- Maximum cable -500m/1600ft, shielded twisted pair.
- Power supply: +15 to 24V, 135mA.
- 19" rack compatible – 3U by 42HP.
- Four screw studs mounted on rear of panel provide secure mounting to any flat panels.



KPD002-501

KPD002-505

Programming Options

NextMove BX is supplied with the MINT programming language and the MINT Programmers Toolkit.

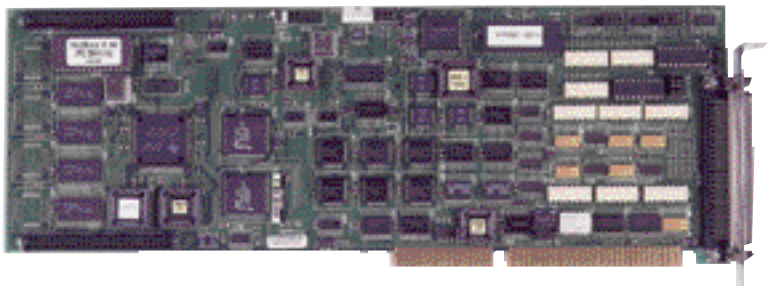
NextMove BX can be programmed in 'C' by cross compiling 'C' code to run directly on the TMS320C31 DSP processor. To do this it is necessary to purchase Baldor's MINT Interface Library. This contains 'C' libraries suitable for use with Borland Delphi, Visual Basic, and Microsoft 'C'. It is also necessary to purchase Texas Instrument's C31 compiler and debugger.

NextMove BX Accessories

Description	Cable Assembly Catalog Number	Length	
		Meters	Feet
CAN Cables	CBL004-501	0.25	0.8
	CBL004-502	0.50	1.6
	CBL004-503	1	3.2
	CBL004-504	2	6.5
	CBL004-505	3	9.8
	CBL004-506	5	16.3
	CBL004-507	10	32.7
	CBL004-508	25	81.8
Feedback Cables for use with 18H	CBL010MF-AI	1	3.2
	CBL020MF-AI	2	6.5
	CBL010MF-A	1	3.2
	CBL020MF-A	2	6.5
	CBL100MF-B	10	32.7
	CBL200MF-B	20	65.4

CAN Expansion Modules	Catalog Number
CAN 8 Digital Inputs	ION001-501
CAN 8 Digital Outputs	ION003-501
CAN 24 Relay Outputs	ION002-501
CAN 24 Inputs, 24 Outputs	ION004-501

Miscellaneous	Catalog Number
CAN Operator Panel 3 axes	KPD002-501
CAN Operator Panel 4 axes	KPD002-505
MINT Interface Library	MNT001-501



NEXTMOVE PC High Performance 2-8 Axis PC Bus Motion Controller

- 2 to 8 axis servo/vector/stepper control.
- Fast 32 bit floating point DSP delivers 250µS update time for 4 servos.
- ISA PC bus plug-in card.
- CE compliant design.
- Dual Port RAM interface to PC.
- Digital and analog I/O.
- MINT™ or "C" programming.
- CANbus port for distributed I/O and operator interface.
- Multi-axis interpolation across eight axes, mixed vector/servo/stepper.
- Gearing, CAMs, flying shears and much more.
- 512k RAM for program and data storage.
- 25µS position capture input.
- Feed rates, and feedrate override can be associated with interpolated moves when used in high speed contouring.
- High speed position latch for precise product registration.

Programmable Functions

NextMove PC is programmed in Baldor's easy to use MINT language, or in "C". Both the MINT programming language and C function libraries support a wide range of motion and control functions as outlined below.

Positional Moves

Absolute & Relative moves allow high speed point to point motion on one or all axes.

Speed, Acceleration & Deceleration can be defined for each move type.

Trapezoidal profiled moves provide the fastest point to point move but exert the maximum jerk and shock on a system.

S-ramp profiled moves provide a more smooth velocity profile that prolongs the life of machine mechanics.

Interpolated Moves

Linear Interpolation across any eight axes, (mixed vector/servo/stepper) allows positional moves to be defined in terms of a linear vectors. Absolute and relative vectored moves are supported.

Circular Interpolation across any 4 pairs of axes simultaneously (mixed vector/servo/stepper) allows a complete or partial arc to be defined. Absolute and relative circular moves are supported.

Splining allows a stream of moves, defined in terms of position, velocity and time to be blended together into a continuous and smooth motion. This is used in applications where path speed and continuous velocity are important.

Contouring allows a string of linear and circular interpolated moves to be blended together into a continuous complex path of motion.

Master/Follower

Electronic Cam replaces the traditional mechanical cam with a servo motor and software programmable cam profile. NextMove PC supports one cam profile for each of the eight axes (vector/servo or stepper). Any axis may be defined as a Master input to a cam and multiple master/cam relationships are supported.

Electronic Gearbox & Clutch enable two motor shafts to be linked together in precise synchronization with a software programmable gear ratio. NextMove PC allows any axis to be geared to any master. Any axis may be defined as the master. Multiple master/gear relationships are supported

Flying Shear allows operations to be performed at regular intervals on a continuously moving web. Acceleration, synchronization and return stroke are linked by software to the movement of the product.

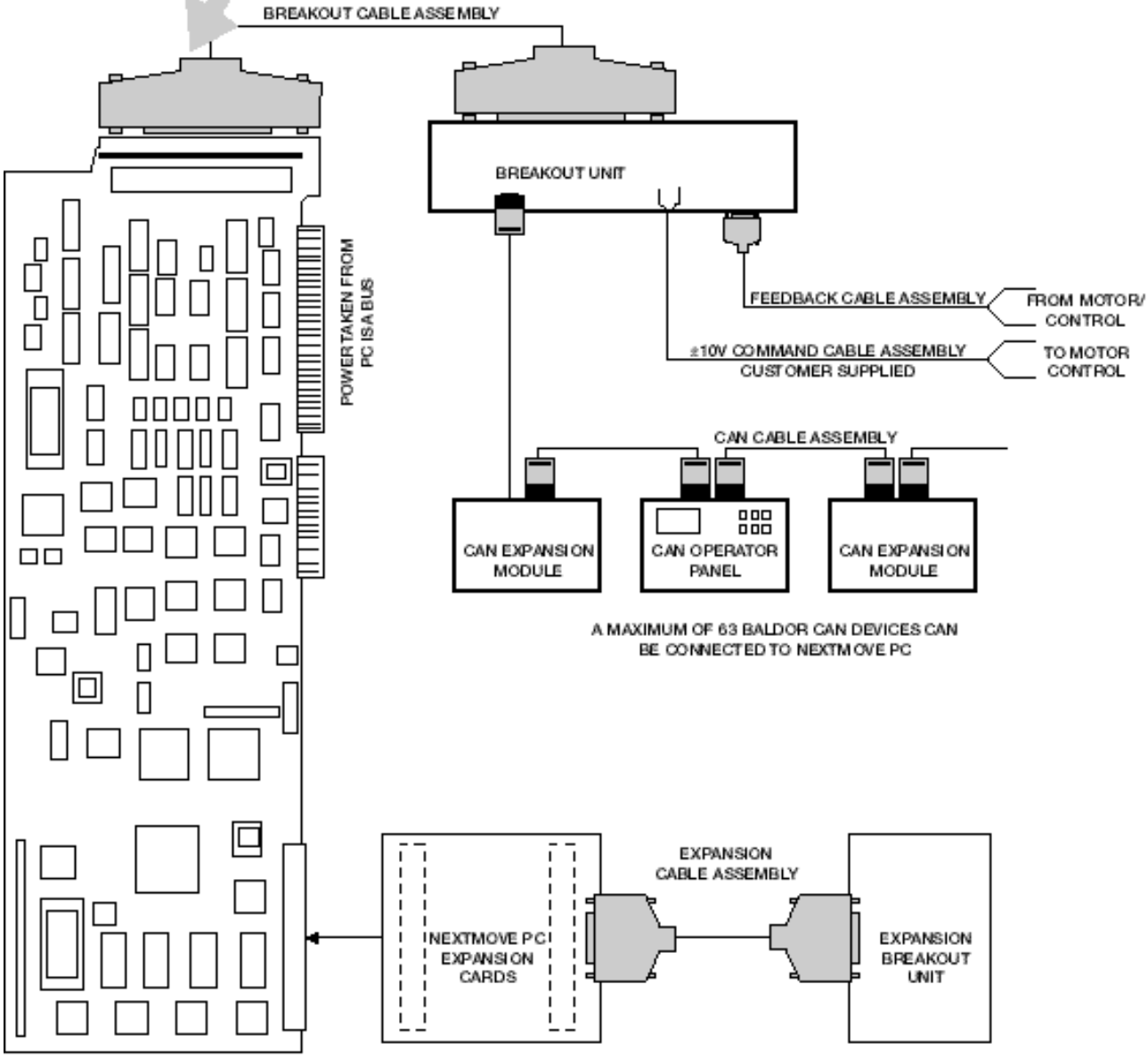
PC Communications

Dual Port RAM is used to communicate program, data and control commands between the PC and NextMove card. This provides a very high speed and efficient method of transferring information without over burdening the PC and NextMove processors.

NextMove PC

Nextmove PC provides high speed interpolation of up to 8 axes, features digital and analog I/O for use in the most demanding process based applications and works with CAN based I/O and MMI. The NextMove line adds 32 bit floating point DSP power. Unlike fixed point DSP controllers, NextMove PC deals accurately with real-world problems in real time.

NextMove PC connects directly to Baldor's vector and servo controls. Cable assemblies are available for feedback between the NextMove PC and control, making connections reliable and easy.


BREAKOUT CABLE ASSEMBLY
BREAKOUT UNIT
POWER TAKEN FROM PC ISA BUS
FEEDBACK CABLE ASSEMBLY
FROM MOTOR/ CONTROL
±10V COMMAND CABLE ASSEMBLY CUSTOMER SUPPLIED
TO MOTOR CONTROL
CAN CABLE ASSEMBLY
CAN EXPANSION MODULE
CAN OPERATOR PANEL
CAN EXPANSION MODULE
A MAXIMUM OF 63 BALDOR CAN DEVICES CAN BE CONNECTED TO NEXTMOVE PC
NEXTMOVE PC EXPANSION CARDS
EXPANSION CABLE ASSEMBLY
EXPANSION BREAKOUT UNIT

Typical Connections

① **DIGITAL INPUTS**
24 digital inputs, user configured for limit, home, stop, error or general purpose.
May be configured as level or edge triggered, and to interrupt user program and call subroutine.
PNP or NPN input types available. Specify at time of order.

② **FAST POSITION CAPTURE**
This input is driven with 5V CMOS logic levels, active low. It is configured to capture the position of all servo axes within 25µS.

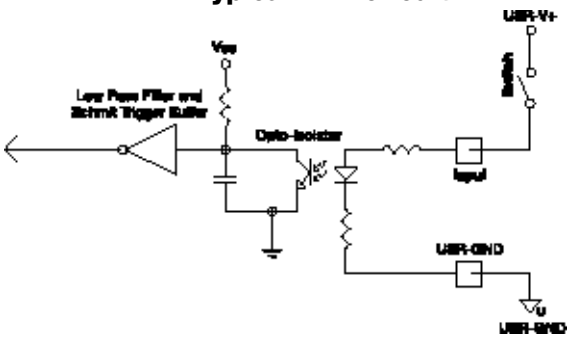
③ **HOME**
One per axis, taken from the 24 digital inputs. Provides reference position for the axis. Three modes of homing: on encoder index, on switch, on both.

④ **LIMIT**
One or two per axis, taken form the 24 digital inputs. Provides end of travel protection. Crash stop axes assigned to input when active.

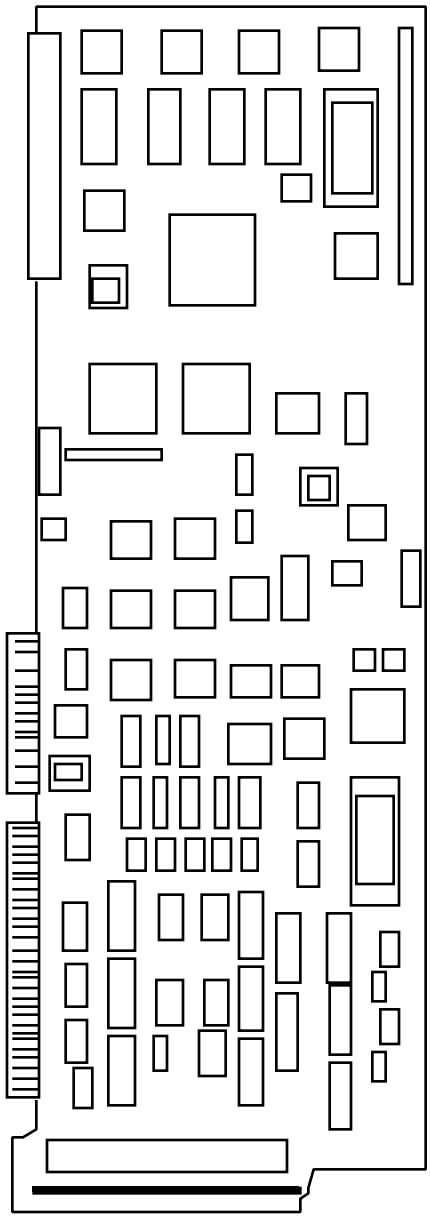
⑤ **DRIVE ERROR INPUT**
One per controller, taken from the 24 digital inputs. Brings all axes to a crash stop when active. Input sense software configurable

⑥ **INPUT TYPES**
PNP inputs are supplied as standard. Opto-isolated, 5-24V high input voltage. Suitable to be driven by any PNP transistor. Common is connected to USR GND of the user supply and the input to USR V+.

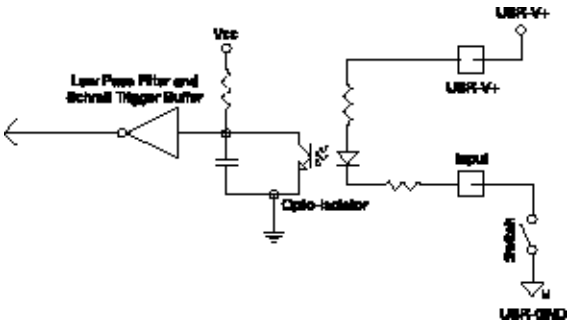
Typical PNP circuit



NPN inputs are available as a custom order. Opto-isolated, 5-24V high input voltage. Suitable to be driven by any NPN transistor. Common is connected to USR V+ of the user supply and the input to USR GND.



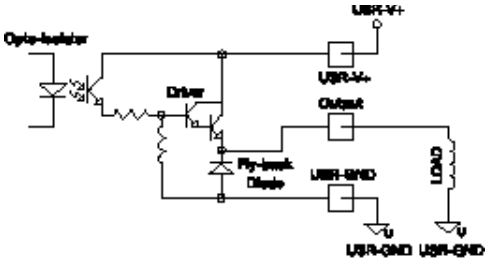
Typical NPN circuit



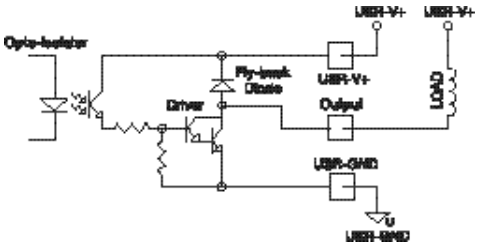
① DIGITAL OUTPUTS

12 digital outputs, which may be user configured for drive enable, error output, or general purpose.
Opto-isolated, 12-24V
Errors can be flagged to MINT™ program.
50mA continuous source on all channels.
350mA max source per channel,
500mA max for all 8 channels.

PNP outputs are supplied as standard.



NPN outputs are available as a custom order.



② FEEDBACK ENCODER

One per servo axis. An additional four encoder channels available on NextMove PC expansion option card.
Incremental encoder for position feedback.
Operates with both single ended (TTL or open collector) or differential (TTL or RS422) output type. Differential is recommended.
Accepts three channel encoders (A, B and Z).
A and B channels are quadrature decoded.
Maximum encoder frequency: 5.3 MHz quadrature counts.

③ AMPLIFIER ANALOG COMMAND OUTPUT

One per axis up to a maximum of four.
± 10V, 12 bit command output.
An additional four command outputs are available on NextMove PC expansion option card.

④ ANALOG INPUTS

8 x 12 bit resolution single ended inputs or
4 x 12 bit resolution, differential inputs.
±10V, ±5V, 0-10V or 0-5V voltage ranges can be set by the user.

⑤ STEPPER OUTPUTS

One Step, one Direction and one Boost output per stepper axis.
5V open drain.
Referenced to system ground.

⑥ PROGRAM MEMORY

512K of RAM is provided for firmware program and data storage. Firmware is download to RAM from the PC via the ISA interface.

⑦ CANbus Port

1Mbit/second CANbus serial link.
Connection to Baldor I/O modules.
Connection to Baldor operator panel.
63 CAN devices may be connected in total.

⑧ DUAL PORT RAM

1K by 16 bit of dual port ram is provided as standard for high speed data transfer.

⑨ EXPANSION OPTIONS

Additional stepper outputs and/or analog drive command outputs may be added using one of Baldor's NextMove expansion cards. See section on accessories and options.

⑩ 100 PIN CONNECTOR

Single, high density, 100 pin D type connector for all signals. EMC shielded and connects to optional breakout unit using shielded cable.

⑪ DRIVE ENABLE RELAY

One per controller.
Form C (SPDT) rated at 24VDC (150 mA).
Common, normally open, normally closed.
Fail safe operation: relay de-energized on an error.

⑫ POWER REQUIREMENTS

Power taken from PC bus:
+5V (830mA), +12V (166mA), –12V (217mA).
External power for opto-isolated outputs: up to 850mA

Input/Output

24 Inputs are level or edge triggered and can be user configured as forward/reverse limits, home, stop, error, or general purpose inputs. General purpose inputs may be configured to interrupt the MINT™ or 'C' program and call a service routine.

12 Outputs are user configured as drive enable, error output or general purpose outputs. All user outputs are over current protected and a fault condition will generate an ERROR to the MINT or 'C' program.

Analog Inputs can be read as 8 x 12 bit values (single ended input) or 4 x 12 values, (differential input).

Remote I/O is connected to the CANbus port and is simply read from, and written to, using MINT or 'C' functions.

Programming Options

MINT is the easiest and quickest way to program the NextMove PC controller. MINT programs are developed using the MINT Programmers Toolkit which is supplied as standard with every NextMove product. MINT executes on the DSP processor of the NextMove card, freeing up the PC's processor to do other work.

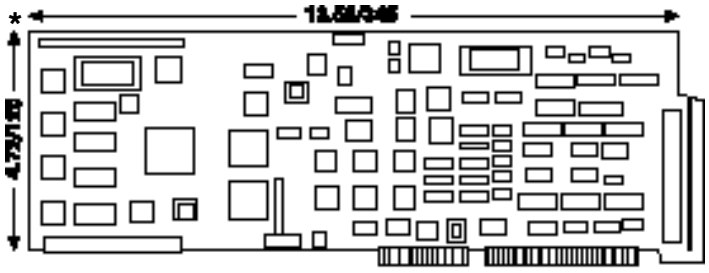
'C' Function Libraries provide an easy way to integrate the control functions of Nextmove PC into a user written 'C' program. 'C' code may also be complied to run on the TMS320C31 processor. The 'C' functions are contained in Baldor's MINT Interface Library CD product, and the TMS320C31 cross complier is available from Texas Instruments.

NextMove PC Catalog Numbers

Number of Servo Axes	Number of Stepper Axes	Input Type	Catalog Number	
			Output Type PNP	Output Type NPN
2	0	PNP	NMP001-511	NMP001-510
		NPN	NMP002-512	NMP002-511
3	0	PNP	NMP001-513	NMP001-512
		NPN	NMP002-514	NMP002-513
4	0	PNP	NMP001-501	NMP001-503
		NPN	NMP002-501	NMP002-503
4	4	PNP	NMP001-515	NMP001-516
		NPN	NMP002-515	NMP002-516
0	4	PNP	NMP001-509	NMP001-508
		NPN	NMP002-510	NMP002-509
6	2	Use expansion card OPT009-501 plus a two axis servo NextMove PC of the required I/O type. This expansion card contains four additional servo circuits and four additional stepper circuits.		
7	1	Use expansion card OPT009-501 plus a three axis servo NextMove PC of the required I/O type. This expansion card contains four additional servo circuits and four additional stepper circuits.		
8	0	Use expansion card OPT009-501 plus a four axis servo NextMove PC of the required I/O type. This expansion card contains four additional servo circuits and four additional stepper circuits.		
0	8	Use expansion card OPT011-501 plus a four axis stepper NextMove PC of the required I/O type. This expansion card contains four additional stepper circuits.		

Maximum number of axis controlled by NextMove PC is eight.

Dimensions (inches/millimeters)



• This is a full spec. ISA card.

Technical Data

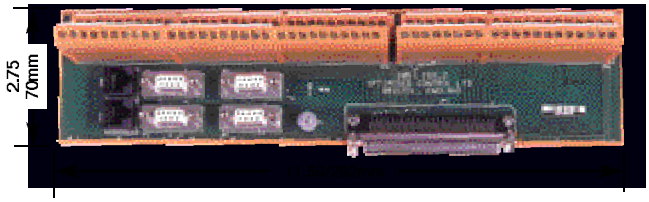
Description	Unit	Specifications
Power taken from PC bus	VDC	+5 (830 mA)
		+12 (166 mA)
		-12 (217mA)
External Power for opto-isolated outputs	VDC	12-24 (up to 850mA)
Operating Temperature	°F	32 to 113
	°C	0 to +45
Weight	lbs.	0.671
	g.	305

Accessories for NextMove PC

BreakOut Module & Cable

The breakout module provides a fast and reliable method of connecting signals to the NextMove PC. All I/O wiring is connected using screw connectors. Encoders use 9 pin D type connectors with the same pinout as other MINT™ motion controllers. Two CANbus connectors allow easy daisy-chaining of the CANbus network.

The breakout module is DIN rail mount and can be connected to NextMove PC using a Baldor cable assembly. The entire assembly, NextMove PC, cable and breakout module, has been designed to ensure continuous shielding of all signals and to meet CE requirements.



NMP004-501

CANbus Accessories

NextMove PC features one CANbus port for connecting to Baldor's I/O modules and operator panel. These accessories offer connection simplicity and a fast and reliable method of expanding the capabilities of the NextMove PC.

Canbus is a high integrity, two wire serial link that transfers data at rates up to 1M bit/second over a distance of 130ft/40m. (3200ft/1000m at 50Kbit/second). With just twisted pair, machine wiring costs material and installation - can be greatly reduced. At the same time, the reduced number of wires can provide greater machine reliability

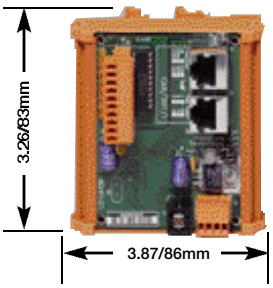
NextMove PC supports the following CANbus accessories.

8 digital input modules
8 digital output modules
8 relay output modules
24 input, 24 output modules
Operator Panels (maximum of 4)
A maximum of 63 CANbus accessories may be connected to NextMove PC.

Each CANbus accessory has two CANbus connectors which are electrically identical. This allows several modules to be 'daisy chained' using Baldor's point to point cable assemblies. I/O modules can be DIN rail mounted for easy installation.

8 Input Module

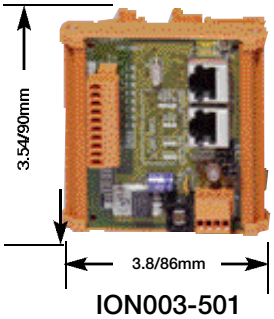
- 8 digital inputs.
- Opto isolated and may be connected to positive or negative common (for use with NPN and PNP output transistors).
- Inputs are guaranteed to be active in the range ± 12V to ± 24V and inactive between ±2V
- LEDs indicate status of each input.
- Read from MINT program using REMOTEIN keyword.
- Two part connectors for power and inputs.
- Power requirements: +12 to +24VDC, 45mA to 90mA respectively.



ION001-501

8 PNP Output Module

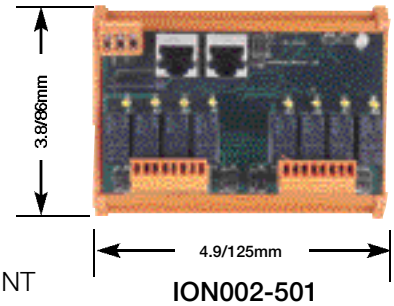
- 8 digital outputs.
- Opto isolated and protected against over current and over temperature.
- 50mA continuous source on all channels.
- 350mA max source on single channel.
- 500mA max total output for all 8 channels on simultaneously.
- LEDs indicate status of each output.
- Written from MINT program using REMOTEOUT keyword.
- Two part connectors for power and outputs.
- Power requirements: +12 to +24VDC, 110mA to 130mA respectively.



ION003-501

8 Relay Output Module

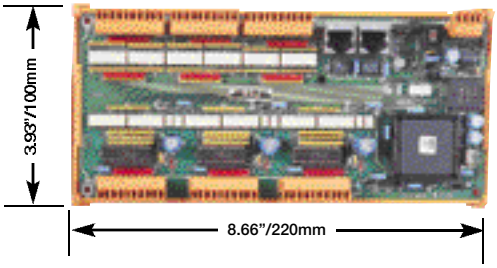
- 8 relay outputs.
- Form C (SPDT) relays rated at 24V (1A). 125 VAC (0.5A), 30 VDC (2A).
- LEDs indicate status of each output.
- Activated from MINT program using REMOTEOUT keyword.
- Two part connectors for power and outputs.
- Power requirements: +24VDC (215mA).



ION002-501

24 Input, 24 Output Module

- 24 outputs are opto isolated and protected against over-current and over-temperature.
- 50mA continuous source on all channels.
- 350mA max source on all channels.
- 500mA max total output for all 8 channels.
- 24 inputs are opto isolated and may be connected to positive or negative common (for use with NPN and PNP output transistors).
- Inputs are guaranteed to be active in the range ±12V to ±24V and inactive between ±2V.
- Power requirements: Voltage range: 12-30V, Current range, 12V (369mA) & 24V (267mA) all inputs and outputs on.



ION004-501

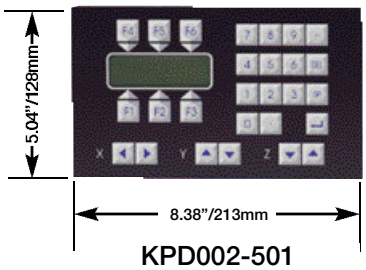
Operator Panel

A full featured Baldor operator panel can connect directly into the CAN-2 expansion port. The panel provides a cost effective and flexible means for inputting and displaying operator information.

MINT™ provides a powerful set of functions for reading from and writing to the panel, allowing a variety of operator interface types to be configured. INPUT waits for a number to be entered, INKEY reads the next key in the serial buffer and READKEY reads the key currently being pressed. CLS clears the screen and LOCATE locates the cursor at a specified location. Function key F1 through F6 are designed to support menu driven applications.

Specifications:

- 20 character by 4 line backlit LCD display.
- 27 keys, X, Y, Z cursor keys, numeric keypad and 6 user definable function keys.
- Tactile feedback on all keys.
- Audible buzzer controlled from software BEEP command.
- Connected to NextMove PC controller via CAN.
- Maximum cable -500m/1600ft, shielded twisted pair.
- Power supply: +15 to 24V (135mA).
- 19" rack compatible – 3U by 42HP
- Four screw studs mounted on rear of panel provide secure mounting to any flat panels.



KPD002-501

Expansion Cards

NextMove PC can be supplied with a maximum of four closed loop vector/servo axis and four stepper axis in a single card configuration.

By adding an expansion card it is possible to increase the number of axes beyond four. The total number of axes cannot exceed eight.

Expansion cards connect directly onto the NextMove PC, as a 'daughter card' and occupy the rear portion of the adjacent ISA slot in the PC. They take power from the Nextmove card, leaving the adjacent ISA connector available for a half slot card. I/O and axes signals are connected via a ribbon cable and 37 pin D type connector on the rear of the PC. Cables and breakout modules are available.

Servo/Stepper Expansion Card

This expansion card contains circuitry for four additional servo axes and four additional stepper axes.

Stepper Expansion Card

The stepper expansion card contains circuitry for four additional stepper axes.

Programming Options

NextMove PC is supplied with the MINT programming language and the MINT Programmers Toolkit.

To program NextMove PC applications to run on the PC host, it is necessary to purchase Baldor's MINT Interface Library. This contains C libraries suitable for use with Borland Delphi, Visual Basic, and MicroSoft C.

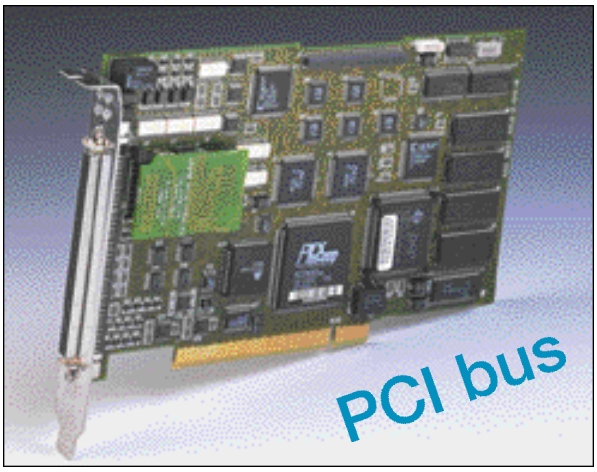
NextMove PC can be programmed in 'C' by cross compiling 'C' code to run directly on the TMS320C31 DSP processor. It is necessary to purchase Baldor's MINT Interface Library and Texas Instrument's C31 complier and debugger.

NextMove PC Accessories

Description	Cable Assembly Catalog Number	Length	
		Meters	Feet
CAN Cables	CBL004-501	0.25	0.8
	CBL004-502	0.50	1.6
	CBL004-503	1	3.2
	CBL004-504	2	6.5
	CBL004-505	3	9.8
	CBL004-506	5	16.3
	CBL004-507	10	32.7
	CBL004-508	25	81.8
Feedback Cables for use with 18H	CBL010MF-AI	1	3.2
	CBL020MF-AI	2	6.5
	CBL010MF-A	1	3.2
	CBL020MF-A	2	6.5
	CBL100MF-B	10	32.7
	CBL200MF-B	20	65.4
Breakout Cables	CBL005-501	1	3.2
	CBL005-502	1.50	4.9
	CBL005-503	3	9.8
Expansion Cables	CBL006-501	1	3.2
	CBL006-502	2	6.5

CAN Expansion Modules	Catalog Number
CAN 8 Digital Inputs	ION001-501
CAN 8 Digital Outputs	ION003-501
CAN 8 Relay Outputs	ION002-501
CAN 24 Inputs, 24 Outputs	ION004-501

Miscellaneous	Catalog Number
CAN Operator Panel	KPD002-501
MINT Interface Library	MNT001-501
Expansion Card, 4 Axis Servo, 4 Axis Stepper	OPT009-501
Expansion Card, 4 Axis Stepper	OPT011-501
Expansion Breakout Unit	OPT010-501
Breakout Unit	NMP004-501



NEXTMOVE PCI
Higher performance
1-8 axis Machine Controller

CE

- 1 to 8 axes: 4 servo/vector plus 4 stepper. Expandable to twelve axes.
- 200 µS update time for four axes
- Dual port RAM interface to PC shipped as standard.
- 200 nS position capture inputs.
- Digital and analog I/O.
- MINT™V4 or 'C' programming.
- **CANopen** protocol for distributed control and peer to peer messaging and control of third party products.
- Baldor CANbus port for distributed I/O modules and operator interfaces.
- Multi-axis interpolation across twelve axes when expansion card fitted.
- Gearing, CAMs, flying shears and much more.
- 2 Mbytes of zero wait state RAM for fast program execution.
- 24Kbytes of non-volatile memory for user parameter storage.

Programmable Functions

NextMove PCI is programmed in MintV4 of Baldor's easy to use MINT language, or in 'C'. It offers greater functionality and a more consistent relationship to 'C'. Existing code can be quickly upgraded using Baldor's code analyzer tool which is shipped with all controllers. Both MINT and 'C' function libraries provide a wide range of motion control functions outlined below and described more fully in the beginning of this section.

Positional Moves

Absolute & Relative moves allow high speed point to point motion on one or all axes.

Speed, Acceleration & Deceleration can be defined for each axis.

Trapezoidal profiled moves provide the fastest point to point move but exert the maximum jerk and shock on a system.

S-ramp profiled moves provide a more smooth velocity profile that prolongs the life of machine mechanics.

Interpolated Moves

Linear Interpolation across any eight axes, (mixed vector/servo/stepper) allows positional moves to be defined in terms of a linear vectors. Absolute and relative vectored moves are supported.

Circular Interpolation across any 4 pairs of axes simultaneously (mixed vector/servo/stepper) allows a complete or partial arc to be defined. Absolute and relative circular moves are supported.

Contouring allows a string of linear and circular interpolated moves to be blended together into a continuous complex path of motion.

Splining allows a stream of moves, defined in terms of position, velocity and time, to be blended together into a continuous and smooth motion. This is used in applications where path speed and continuous velocity are important.

PC Communications

Dual Port RAM is used to communicate program, data and control commands between the PC and NextMove PCI card. This provides a very high speed and efficient method of transferring information without over burdening the PC and NextMove processors.

Master/Follower

Electronic Cam replaces the traditional mechanical cam with a servo motor and software programmable cam profile. NextMove PCI supports one cam profile for each of the eight axes (vector/servo or stepper). Any axis may be defined as a Master input to a cam and multiple master/cam relationships are supported.

Electronic Gearbox & Clutch enable two motor shafts to be linked together in precise synchronization with a software programmable gear ratio. NextMove PCI allows any axis to be geared to any master. Any axis may be defined as the master. Multiple master/gear relationships are supported.

Flying Shear allows operations to be performed at regular intervals on a continuously moving web. Acceleration, synchronization and return stroke are linked by software to the movement of the product.

Input/Output

20 Inputs are level or edge triggered and can be user configured as forward/reverse limits, home, stop, error, or general purpose inputs. The first 4 inputs may be used as hardware position capture inputs and offer a typical delay of 200 nS. General purpose inputs may be configured to interrupt the MINT™ or 'C' program and call a service routine.

12 Outputs are user configured as drive enable, error output or general purpose outputs. To suit the application needs, different output modules are available. Opto-isolation is standard in all configurations and is fitted directly to the PCI card. PNP darlington outputs are shipped as standard. NPN FET outputs are also available.

All outputs are configurable as drive enable, and the first 4 outputs can be configured for fast position compare allowing an output to be toggled very accurately at a predetermined position, typical turn on delay is less than 4µS. Turn off 40µS.

Analog Inputs can be read as 4 x 12 bit values, differential ±10V, 0-10V, ± 5V, 0-5V analog inputs are provided. The inputs are filtered with 1KHz second order butterworth filters for maximum noise immunity.

CANbus ports provide support for up to 63 CAN devices. One channel is configured for use with Baldor's I/O modules and keypad. Another channel is dedicated to **CANopen** for connection to third party devices.

PC Communications

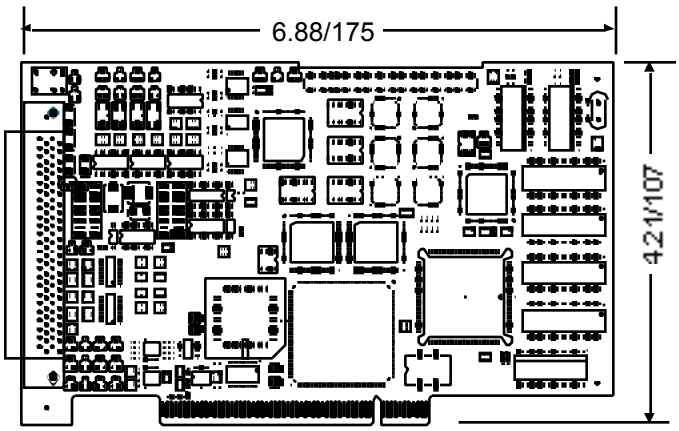
Dual Port RAM is used to communicate program, data and control commands between the PC and NextMove PCI card. This provides a very high speed and efficient method of transferring information without over burdening the PC and NextMove processors.

NextMove PCI Accessories

Controller Card See Note 1	**Catalog Number**
NextMove PCI, 1 axis - servo/stepper, user configured	PCI001-501
NextMove PCI, 2 axes - servo/stepper, user configured	PCI001-502
NextMove PCI, 3 axes - servo/stepper, user configured	PCI001-503
NextMove PCI, 4 axes - servo/stepper, user configured	PCI001-504
NextMove PCI, 8 axes - 4 servo and 4 stepper	PCI001-505

Note: 1) NMPCI shipped with PNP output modules as standard

Dimensions (inch/millimeters)

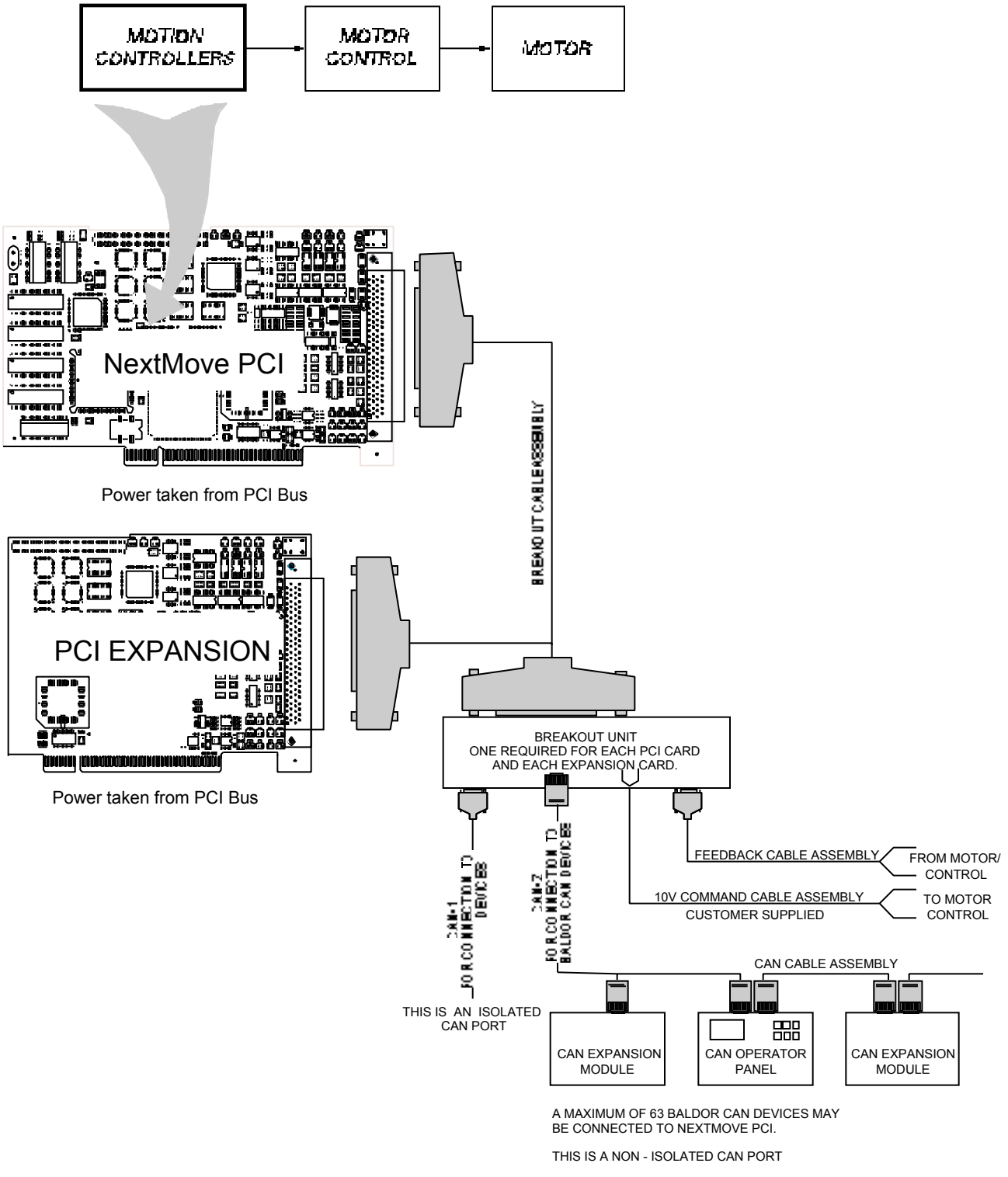


Technical Data

Description	Unit	Specifications
Power taken from PCI bus 15 watt card	VDC	+5 @ (1.5A)
		+12 @ (100mA)
		-12 @ (100mA)
External Power for opto-isolated outputs	VDC	12-24 (up to 850mA)
Operating Temperature	°F	32 to 113
	°C	0 to +45
Weight	lbs.	0.286
	g.	130

NextMove PCI

NextMove PCI is Baldor's highest performance motion controller and can run MINT™ programs up to 800% faster than the field proven NextMove PC. (Applications programmed in 'C' run 300% faster.) Using a 32 bit floating point digital signal processor running at 50MHz, together with ultra-fast zero wait state memory, the NextMove PCI can easily control up to eight axes - mixed servo, stepper or vector - in some of the most demanding applications. Further expansion up to 12 axes is possible using expansion cards.



Typical Connections

DIGITAL INPUTS
20 digital inputs, user configured for limit, home,stop, error or general purpose. May be configured as level or edge triggered, and to interrupt user program and call subroutine.

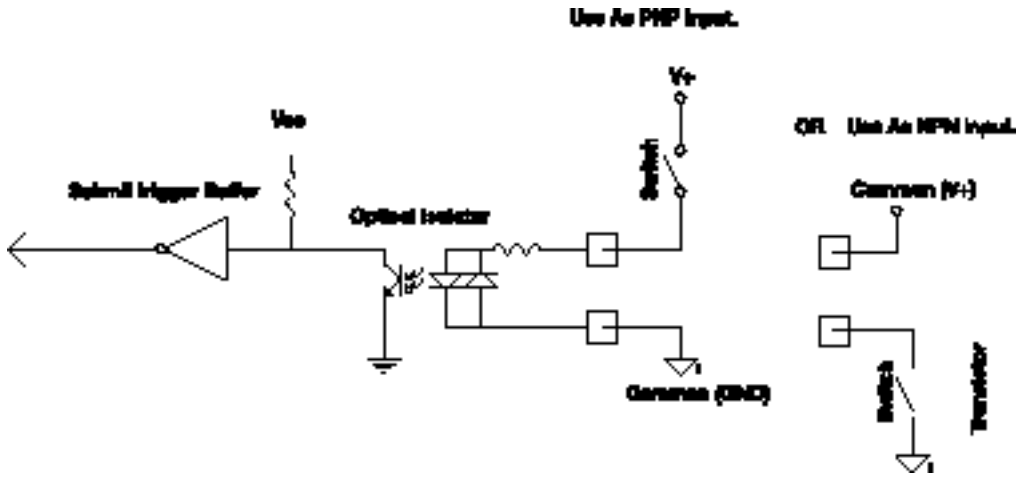
FAST POSITION CAPTURE
The first four of the 20 inputs can be used as position capture inputs, one per servo axis. The position is latched within 200 nS of an active edge.

HOME
One per axis, taken from the 20 digital inputs. Provides reference position for the axis.Three modes of homing: on encoder index, on switch, on both.

LIMIT
One or two per axis, taken form the 20 digital inputs. Provides end of travel protection. The response to an active input can be programmed by the user..

DRIVE ERROR INPUT
One per axis, taken from the 20 digital inputs. Brings all axes to a crash stop when active. Input sense is software configurable.

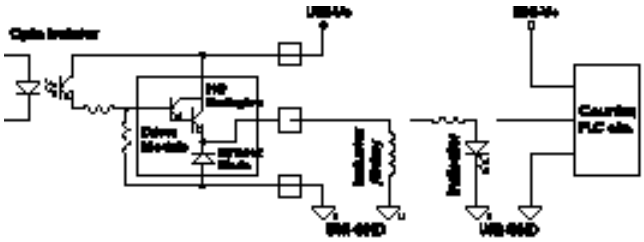
INPUT CHARACTERISTICS
The digital inputs use ac opto-isolators and may be connected to positive or negative common. (for use with NPN or PNP outputs). These are arranged as one bank of eight and one bank of twelve each with a common rail. With the common rail connected to the positive voltage the inputs can be driven with NPN drive transistors or low-side switches. Alternatively they may be driven with PNP drive transistors or high-side switches when the common rail is connected to the low voltage.



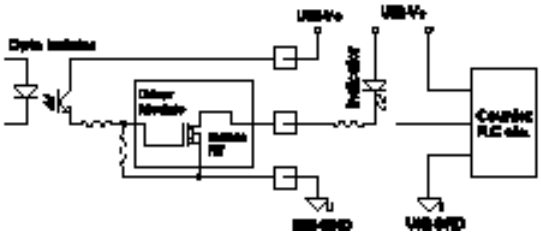
DIGITAL OUTPUTS

12 digital outputs, which may be user configured for drive enable, error or general purpose outputs. A removable output module is fitted to the Nextmove PCI allowing the type of output to be adapted to the application requirements. NPN (FET) or PNP (Darlington) output modules are available. PNP shipped as standard.

PNP OUTPUT Module – shipped as standard with every Nextmove PCI controller.



FET OUTPUT Module - Optional



ENCODER INPUTS

One per servo axis, plus one Master per card. An additional four encoder channels are available on NextMove PCI expansion option card. Incremental encoder for position feedback. Operates with differential (TTL or RS422) outputs only. Accepts three channel encoder (A, !A, B, !B, Z, !Z). A & B channels are quadrature decoded. Maximum encoder frequency is 7.5 million quadrature counts per second.

ANALOGUE AMPLIFIER COMMAND OUTPUT

One per servo axis up to a maximum of four. Ò10V, 14 bit command output. An additional four command outputs are available on NextMove PCI expansion option card.

ANALOGUE INPUTS

4 x 12 bit resolution, differential inputs. ±5V±10V, 0-10V or 0-5V voltage ranges can be set by the user in software.

STEPPER OUTPUTS

NMPCI can be supplied with up to four axis of stepper. One Step and one Direction output per stepper axis.Signals from the NextMove PCI card are 5V TTL single ended signals. Output signals from the NextMove PCI breakout card are 5V differential line drivers. Maximum frequency is 3 million pulses per second.

PROGRAM MEMORY

2 Mbyte of RAM for storage of operating system, user program and data. The operating system is downloaded to the NextMove PCI via the dual port RAM interface. In addition to this there is 24 Kbytes of auto storing non volatile RAM (does not require a battery) for non-volatile variable storage.

CANBUS CHANNELS

NMPCI has two CANbus channels. CAN channel 1 is used to connect to third party **CANopen** devices such as operator panels, pneumatic valve manifolds, analogue and digital I/O blocks. The output signals from the NextMove PCI require CAN transceivers to be fitted. Opto-isolated CAN transceivers are fitted to the NextMove PCI breakout unit are as standard. See accessories.

CAN channel 2 is used to connect to Baldor's range of I/O modules and operator panels. See accessories. The output signals from the NextMove PCI require CAN transceivers to be fitted. Non-isolated CAN transceivers are fitted to the NextMove PCI breakout unit are as standard.

DUAL PORT RAM

Shipped as standard with all NextMove PCI controllers. A 4K x 32 (16 Kbytes) dual port RAM connects directly to the 33MHz, 32 bit PCI interface to provide very high speed data transfer.

EXPANSION OPTIONS

Additional stepper outputs and/or analogue drive command outputs may be added using one of Baldor's NextMove PCI expansion cards. See the accessories section.

100 PIN CONNECTOR

All signal connections are made through a single 100 way connector. This provides a clean and EMC compliant connection the the Baldor breakout unit. Please note that this connector is different from our NextMove PC connector.

RELAY OUTPUT

One per controller. Form C (SPDT) rated at 24V DC, 150mA. Common, normally open, normally closed connections. Relay de-energizes on the occurrence of an error condition. The type of activating error

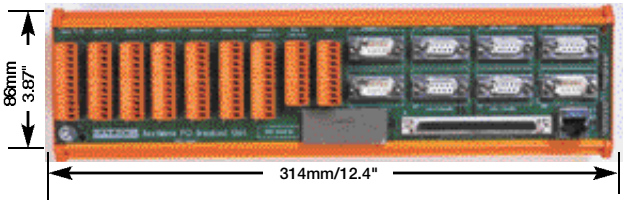
POWER REQUIREMENTS

Power taken from PCI bus: +5V (1500mA), +12V (100mA), -12V (100mA). (15W PCI class)
External power required for opto-isolated outputs: up to 850mA.

Accessories for NextMove PCI

BreakOut Module & Cable

The breakout module provides a fast and reliable method of connecting signals to the NextMove PCI. All I/O wiring is connected using two-part connectors. Encoders use 9 pin D type connectors with the same pin-out as other MINT™ motion controllers. The breakout module is DIN rail mount and can be connected to NextMove PCI using a Baldor cable assembly. The entire assembly, NextMove PCI, cable and breakout module, has been designed to ensure continuous shielding of all signals and to meet CE requirements.



PCI003-501

CANbus Accessories

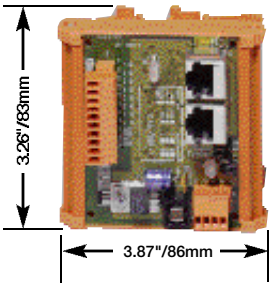
NextMove PCI features two CANbus ports. CAN-1 for connecting to a wide array of third-party **CANopen** devices and CAN-2 for connecting to Baldor's I/O modules and operator panel. These accessories offer connection simplicity and a fast and reliable method of expanding the capabilities of the NextMove PCI. Can-1 uses a 9 pin D type connector in accordance with the **CANopen** specification and an opto-isolated driver is standard to the breakout module. Can-2 uses the same RJ45 connector as Baldor's CANbus accessories and a non-isolated driver standard to the breakout module. Consult the factory is you require isolation on CAN-2. NextMove PCI supports the following Baldor CANbus accessories.

8 digital input module
8 digital output module
8 relay output module
24 input, 24 output module
Operator Panels (maximum of 4)
A maximum of 63 CANbus accessories may be connected to NextMove PCI.

Each CANbus accessory has two CANbus connectors that are electrically identical. This allows several modules to be 'daisy chained' using Baldor's point to point cable assemblies. I/O modules can be DIN rail mounted for easy installation.

8 Input Module

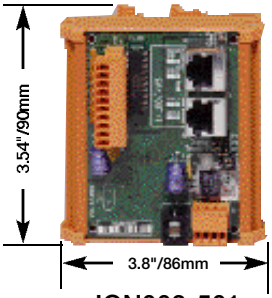
- 8 digital inputs.
- Opto isolated and may be connected to positive or negative common (for use with NPN and PNP output transistors).
- Inputs are guaranteed to be active in the range ± 12V to ± 24V and inactive between ±2V
- LEDs indicate status of each input.
- Read from MINT program using REMOTEIN keyword.
- Two part connectors for power and inputs.
- Power requirements: +12 to +24VDC, 45mA to 90mA respectively.



ION001-501

8 PNP Output Module

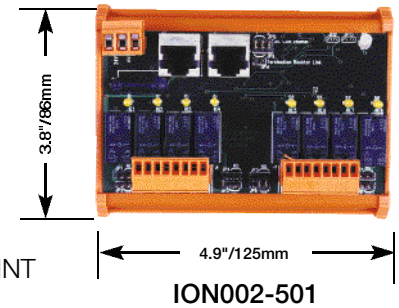
- 8 digital outputs.
- Opto isolated and protected against over current and over temperature.
- 50mA continuous source on all channels.
- 350mA max source on single channel.
- 500mA max total output for all 8 channels on simultaneously.
- LEDs indicate status of each output.
- Written from MINT program using REMOTEOUT keyword.
- Two part connectors for power and outputs.
- Power requirements: +12 to +24VDC, 110mA to 130mA respectively.



ION003-501

8 Relay Output Module

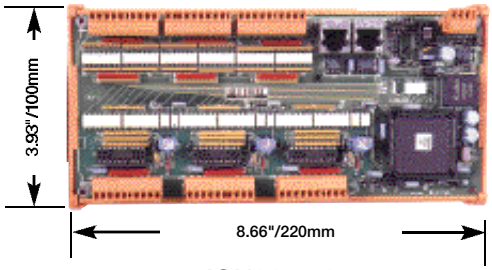
- 8 relay outputs.
- Form C (SPDT) relays rated at 24V (1A). 125 VAC (0.5A), 30 VDC (2A).
- LEDs indicate status of each output.
- Activated from MINT program using REMOTEOUT keyword.
- Two part connectors for power and outputs.
- Power requirements: +24VDC (215mA).



ION002-501

24 Input, 24 Output Module

- 24 outputs are opto isolated and protected against over-current and over-temperature.
- 50mA continuous source on all channels.
- 350mA max source on all channels.
- 500mA max total output for all 8 channels.
- 24 inputs are opto isolated and may be connected to positive or negative common (for use with NPN and PNP output transistors).
- Inputs are guaranteed to be active in the range ±12V to ±24V and inactive between ±2V.
- Power requirements: Voltage range: 12-30V, Current range, 12V (369mA) & 24V (267mA) all inputs and outputs on.



ION004-501

Operator Panel

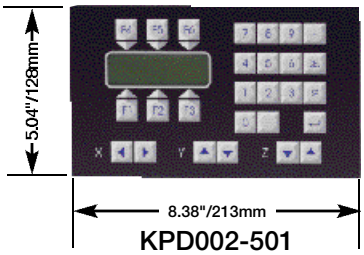
A full featured Baldor operator panel can connect directly into the CAN-2 expansion port. The panel provides a cost effective and flexible means for inputting and displaying operator information.

MINT™ provides a powerful set of functions for reading from and writing to the panel, allowing a variety of operator interface types to be configured. INPUT waits for a number to be entered, INKEY reads the next key in the serial buffer and READKEY reads the key currently being pressed. CLS clears the screen and LOCATE locates the cursor at a specified location. Function key F1 through F6 are designed to support menu driven applications.

Specifications:

- 20 character by 4 line backlit LCD display.
- 3 axes model: total of 27 keys, X, Y, Z cursor keys, numeric keypad and 6 user definable function keys.
- 4 axes model: total of 41 keys, axis 1, 2, 3, 4, cursor keys, numeric keypad and 18 user definable function keys
- Tactile feedback on all keys.
- Audible buzzer controlled from software BEEP command.
- Connected to NextMove PC controller via CAN.
- Maximum cable -500m/1600ft, shielded twisted pair.
- Power supply: +15 to 24V (135mA).
- 19" rack compatible – 3U by 42HP
- Four screw studs mounted on rear of panel provide secure mounting to any flat panels.

Expansion Cards

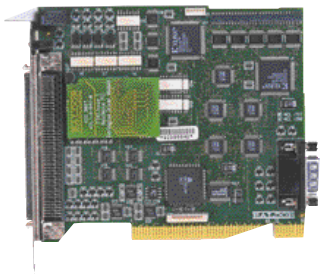


KPD002-501

KPD002-505

NextMove PCI can support a maximum of four servo/vectors and four steppers in a single card configuration. By adding an expansion card it is possible to increase the number of controlled axes up to a maximum of twelve with two expansion cards. Each card occupies a single PCI card slot and is connected to the main controller card using a bridging connector fitted across adjacent cards. Expansion cards take power from the PCI bus. All external signals are brought out on a 100 way connector which has a pin configuration identical to that of the NextMove PCI. This allows the same breakout unit and cable types to be used.

Two different types of expansion card are available. A four axes card in which each axis may be configured as a servo or stepper, and an eight axis card which features four axes of servo and four axes of stepper.



PCI 002-501 or PCI 002-502

Developers Kit

The developers kit provides a quick and cost effective way of designing NextMove PCI into your application. It includes an eight axes controller, together with all the necessary accessories and software to get your system moving. In addition one of each type of output driver module and CAN interface module are included to allow complete evaluation of the available options.

NextMove PCI Accessories

Description	
Expansion Card, 4 axes - servo/stepper, user configured-see note 3	PCI002-501
Expansion Card, 8 axes - 4 servo and 4 stepper-see note 3	PCI002-502
Breakout unit - for controller & expansion cards - See note 2	PCI003-502
CAN Expansion 8 Digital Inputs	ION001-501
CAN Expansion 8 Digital Outputs	ION003-501
CAN Expansion 8 Relay Outputs	ION002-501
CAN Expansion 24 Inputs, 24 Outputs	ION004-501
CAN Operator Panel (3 axis)	KPD002-501
CAN Operator Panel (4 axis)	KPD002-505
MINT™ Interface Library	Shipped with Nextmove PCI
Stepper output module - differential drive output	OPT025-501
Isolated CAN module - factory fitted option	OPT025-502
Non-isolated CAN module - factory fitted option	OPT025-503
Expansion interconnect (2 card)	OPT025-504
Expansion dual interconnect (2 card)	OPT025-505
NextMove PC to PCI connection adapter	OPT025-506
PCI, Output Module PNP darlington Note 1	OPT025-507
PCI, Output Module NPN FET	OPT025-508
Developers Kit: comprising: NextMove PCI, 8 axes - 4 servo and 4 stepper, Breakout unit, Breakout cable 2 meter, NextMove PC to PCI connection adapter, NextMove PCI, Output Module NPN FET - optional, Manuals & Software	PCI10-501

Notes:
1) NMPCI shipped with PNP output modules as standard
2) NMPCI Breakout Module shipped with:
Isolated CAN Module fitted to J11 - CANopen slot Non-Isolated CAN Module fitted to J14 - Baldor CAN Stepper output module fitted to J15/J16
3) NMPCI Expansion card shipped with interconnect (1 card)

Description	Cable Assembly Catalog Number	Length	
		Meters	Feet
CAN Cables	CBL004-501	0.25	0.8
	CBL004-502	0.50	1.6
	CBL004-503	1	3.2
	CBL004-504	2	6.5
	CBL004-505	3	9.8
	CBL004-506	5	16.3
	CBL004-507	10	32.7
	CBL004-508	25	81.8
Feedback Cables for use with 18H	CBL010MF-A	1	3.2
	CBL020MF-A	2	6.5
	CBL100MF-B	10	32.7
	CBL200MF-B	20	65.4
Breakout Cables	CBL021-501	1	3.2
	CBL021-502	1.50	4.9
	CBL021-503	3	9.8
Expansion Cables	CBL006-501	1	3.2
	CBL006-502	2	6.5

MintDrive™ Single-Axis Motion Controller.

The MintDrive™ integrates a powerful motion controller and a brushless AC servo into a single compact package including a power supply.

The MintDrive integrates the key functions of motion controller into a single, easy to program, standalone package. Motion control, I/O handling, serial communications, machine level networking and optional operator panel work together under the control of a MINT™ application program which is stored within the drive.

- 2.5A, 5A, 7.5A 10A and 15A continuous power output rating
- Direct on line connection to 115 or 230 power input
- Linear encoder feedback
- Setup via Auto-Tuning
- Simulated encoder output
- Position, velocity and torque/force modes
- Digital and analog I/O
- Powerful motion control functions
- Programmable in MINT
- Point to point moves
- Software CAMs and gearing
- Two CANbus ports for distributed I/O and operator interface
- CAN open protocol for peer to peer messaging and control of third party I/O modules
- RS232 and RS485 serial ports
- Flash memory for program and data storage
- Overvoltage
- Short Circuit Proof
- Over Temperature
- Over Current
- Resolver Fault
- Undervoltage
- I^2T

Programmable Functions

The MintDrive is programmed in Baldor's easy to use MINT language. MINT supports a wide range of motion and control functions which are outlined below and described more fully in the beginning of this section.

Positional Moves

Absolute & Relative move types allow high speed point to point motion on one or all axes.

Speed, Acceleration & Deceleration can be defined for each move type.

Trapezoidal profiled moves provide the fastest point to point move but exert the maximum jerk and shock on a system.

S-ramp profiled moves provide a more smooth velocity profile that prolongs the life of machine mechanics.

Contouring allows a stream of point to point moves to be blended together into a continuous and smooth motion.

Master/Follower

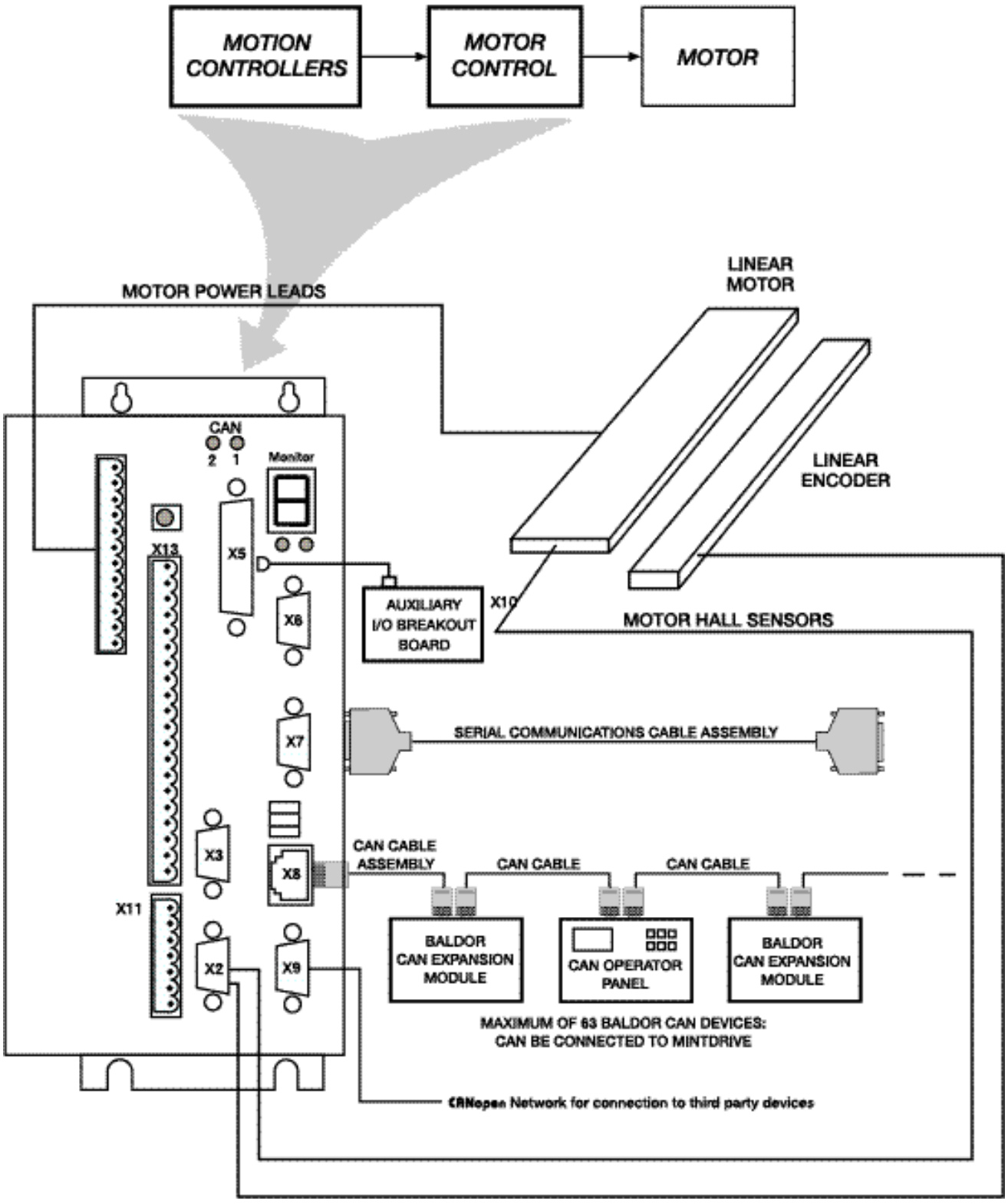
Electronic Cam replaces the traditional mechanical cam with a servo motor and software programmable cam profile. MintDrive features a second encoder input for use as a Master to the cam.

Electronic Gearbox & Clutch enables two motor shafts to be linked together in precise synchronization with a software programmable gear ratio. The MintDrive features a second encoder input for use as the Master to the gearbox.

Flying Shear allows operations to be performed at regular intervals on a continuously moving web. Acceleration, synchronization and return stroke are linked by software to the movement of the product. The MintDrive supports flying sheer by synchronizing it's servo axis to an external material feed axis.

MintDrive™

The MintDrive™ is a single-axis brushless AC Servo control with integrated motion controller.

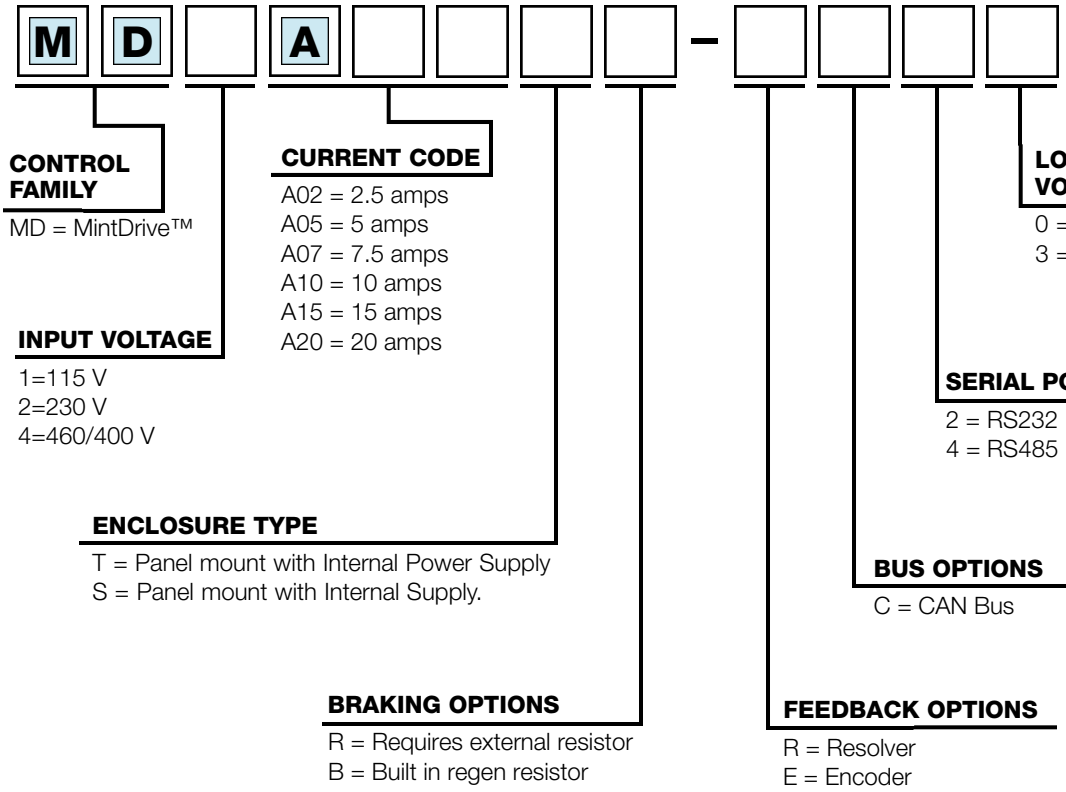


MintDrive™ Catalog Numbers

Input Voltage		115 VAC 1Ø		230 VAC	
Bus Voltage		160VDC		300VDC	
Output Current Amps (rms)		Catalog Number	Package Size	Catalog Number	Package Size
Cont.	Peak				
With integral logic power supply					
2.5	5	MD1A02TB-EC20	A	MD2A02TB-EC20①	A
5	10	MD1A05TB-EC20	B	MD2A05TB-EC20①	B
7.5	15	MD1A07TR-EC20	B	MD2A07TR-EC20①	B
10	20	MD1A10SR-EC20	E	MD2A10SR-EC20②	E
15	30	MD1A15SR-EC20	E	MD2A15SR-EC20②	E
Requires external +24V DC logic power supply					
2.5	5	MD1A02TB-EC23	A	MD2A02TB-EC23①	A
5	10	MD1A05TB-EC23	B	MD2A05TB-EC23①	B
7.5	15	MD1A07TR-EC23	B	MD2A07TR-EC23①	B
10	20	MD1A10SR-EC23	E	MD2A10SR-EC23¡②	E
15	30	MD1A15SR-EC23	E	MD2A15SR-EC23②	E

Notes: ①1Ø VAC input ② 3Ø VAC input

Catalog Identification/Option Specifying Information



Typical Connections

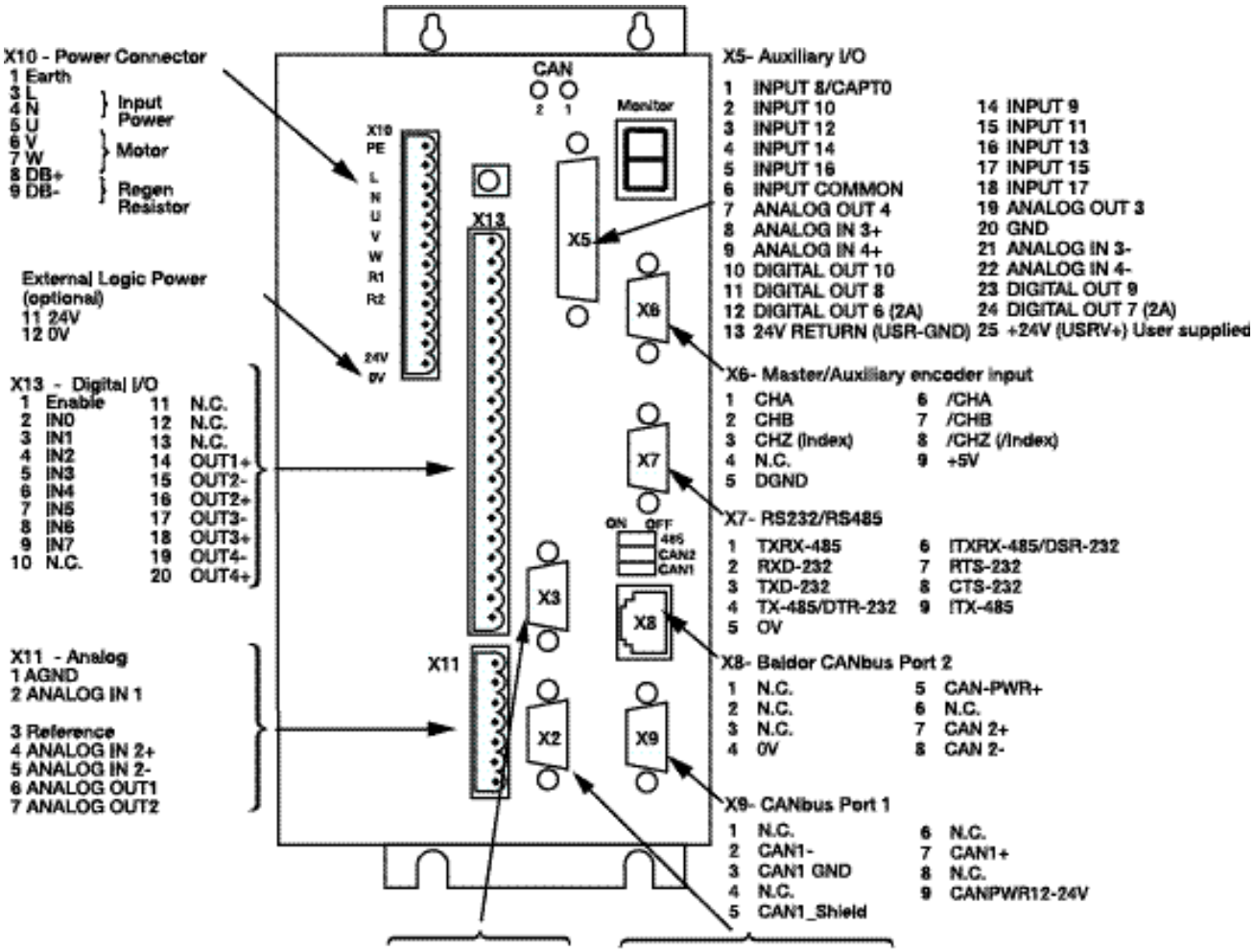


Diagram applies to 2.5A, 5A, and 7.5A models.

Communications

RS232 port supports the industry standard full duplex ASCII protocol. This allows easy connection to almost any device with a serial port.

RS485 port supports **multi-drop** and allows up to 16 MintDrives™ to be linked together on an RS485 network.

Comms Array provide an efficient way to transfer data bidirectionally between a MINT™ program running on the motion drive and a separate user program running on the host controller. Comms arrays give the RS485 serial port the same functionality as a parallel dual port ram.

Input/Output

Eight User Inputs are read independently or as bytes of information. Eight user inputs may be configured to interrupt the MINT program.

Nine User Outputs can be written to independently, or as a single byte of information. All user outputs are over- current protected and a fault condition will generate an ERROR command to the MINT program. One digital output that can be toggled at programmable axis positions.

Four Analog Inputs can be read as two 12 bit inputs and two 10 bit inputs.

Four Analog Outputs of 8 bit resolution.

Drive enable, forward and reverse **limits** and a motor **thermostat** input control the power stage of the drive. Their status may be read from a MINT program.

An optional auxiliary I/O breakout board (OPT 017-501) for connection to X5 in available. The board has two-part screw terminals for all of the digital inputs and outputs, analog I/O, along with indicator LEDs. A 6ft (2m) cable (CBL 022-502) is available for connection.

Technical Data

Description	Unit	Specification
Input Bus Voltage 1 phase models	VAC	115, 1 phase (Range: 97-125)
		230, 1 phase (Range: 220-250)
Input Bus Voltage 3 phase models	VAC	230, 3 phase (Range: 220-250)
Input Logic supply -	VDC	+20 to 30 VDC
Optional Customer Supplied	Amps	1.75A
Efficiency	%	>95
Minimum Load Inductance	µH	200
Operating Altitude	Feet	3300 (Above derate 2% per 1000)
	Meters	1000 (Above derate 2% per 300)
Operating Temperature	°C	0 to +40 (Above derate 2%/°C to max 60°C)
	°F	32 to 104 (Above derate 1%/°F to max 140°F)
Storage Temperature	°C	-30 to +60
	°F	-22 to +140
Humidify	%	10 to 90 non-condensing
Shock		1G
Vibration		1/2G, 10-60 Hz

Accessories for MintDrive™

CANbus Accessories

The MintDrive™ features two CANbus ports. One is used for connecting to Baldor's I/O modules and operator panel the second is used to connect to third party CAN open I/O devices. These accessories offer connection simplicity and a fast and reliable method of expanding the capabilities of the MintDrive.

CANbus is a high integrity, two wire serial link that transfers data at rates up to 1M bit/second over a distance of 40m/130ft (1000m/3200ft at 50Kbit/second). With just a twisted pair, machine wiring costs, material and installation, can be greatly reduced. At the same time, the reduced number of wires can provide greater machine reliability.

CAN port 1 supports the CAN open protocol for peer to peer messaging between multiple MintDrives, and for control of third party I/O modules.

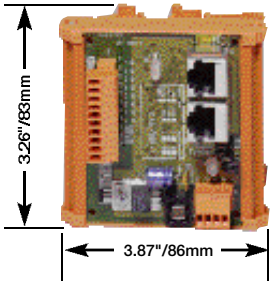
The MintDrive supports the following Baldor CANbus accessories on CAN port 2.

8 digital input modules
8 digital output modules
8 relay output modules
24 input, 24 output modules
Operator panels (maximum of 4)

A maximum of 63 Baldor CANbus accessories may be connected to MintDrive.

Each Baldor CANbus accessory has two RJ45 CANbus connectors which are electrically identical. This allows several modules to be 'daisy chained' using Baldor's point to point cable assemblies. I/O modules can be DIN rail mounted for easy installation.

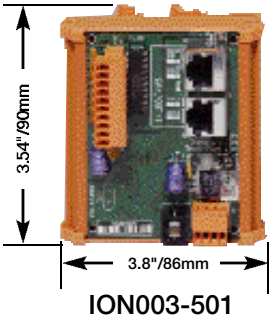
8 Input Module



ION001-501

- 8 digital inputs.
- Opto isolated and may be connected to positive or negative common (for use with NPN and PNP output transistors).
- Inputs are guaranteed to be active in the range ±12V to ± 24V and inactive between ±2V.
- LEDs indicate status of each input.
- Read from MINT program using REMOTEIN keyword.
- Two part connectors for power and inputs.
- Power requirements: +12 to +24VDC, 45mA to 90mA respectively.

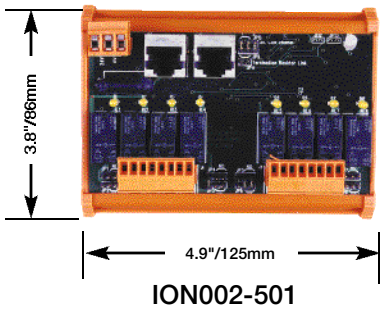
8 PNP Output Module



ION003-501

- 8 digital inputs.
- Opto isolated an protected against over current and over temperature.
- 50mA continuous source on all channels.
- 350mA max source on single channel.
- 500mA max total output for all 8 channels on simultaneously.
- LEDs indicate status of each output.
- Activated from MINT program using REMOTEOUT keyword.
- Two part connectors for power and outputs.
- Power requirements: +12 to +24VDC, 110mA to 130mA respectively.

8 Relay Output Module

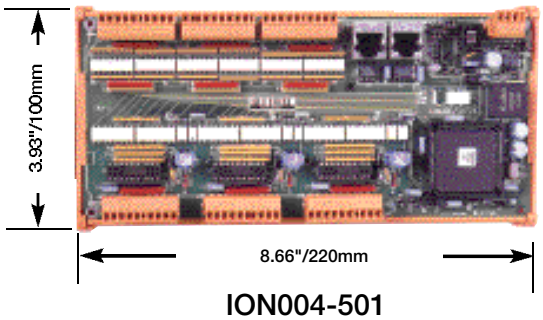


ION002-501

- 8 relay outputs.
- FORM C (SPDT) Relays rated at 0.5A @ 125 VAC, 2A @ 30 VDC.
- LEDs indicate status of each output.
- Activated from MINT program using REMOTEOUT keyword.
- Two part connectors for power and outputs.
- Power requirements: +24VDC, 215mA.

24 Input, 24 Output Module

- 24 outputs are opto isolated and protected against over current and over temperature.
- 50mA continuous source on all channels.
- 350mA max source on all channels.
- 500mA max total output for all 8 channels.
- 24 inputs are opto isolated and may be connected to positive or negative common (for use with NPN and PNP output transistors).
- Inputs are guaranteed to be active in the range ±12V to ±24V and inactive between ±2V.
- Power requirements: Voltage range: 12-30V, Current range, 369mA@12V & 267mA@24V all inputs and outputs on.



ION004-501

Operator Panel - CAN Bus

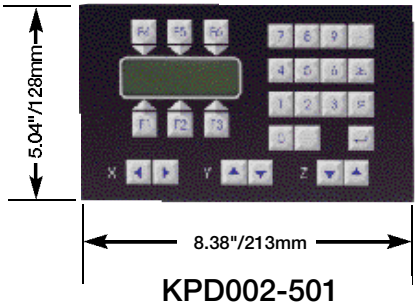
Baldor's full featured operator panel connects to the CANbus port of the MintDrive™. The panel provides a cost effective and flexible means for inputting and displaying operator information.

MINT™ provides a powerful set of functions for reading from and writing to the panel, allowing a variety of operator interface types to be developed. INPUT waits for a number to be entered, INKEY reads the next key in the serial buffer and READKEY reads the key currently being pressed. CLS clears the screen and LOCATE locates the cursor at a specified location.

Function keys are designed to support menu driven applications.

Specifications:

- 20 character by 4 line backlit LCD display.
- 3 axes model: total of 27 keys, X, Y, Z cursor keys, numeric keypad and 6 user definable function keys.
- 4 axes model: total of 41 keys, axis 1, 2, 3, 4, cursor keys, numeric keypad and 18 user definable function keys
- Tactile feedback on all keys.
- Audible buzzer controlled from software BEEP command.
- Connected to MintDrive via CAN.
- Maximum cable -500m/1600ft, shielded twisted pair.
- Power supply: +15 to 24V, 135mA.
- 19" rack compatible – 3U by 42HP.
- Four screw studs mounted on rear of panel provide secure mounting to any flat panels.



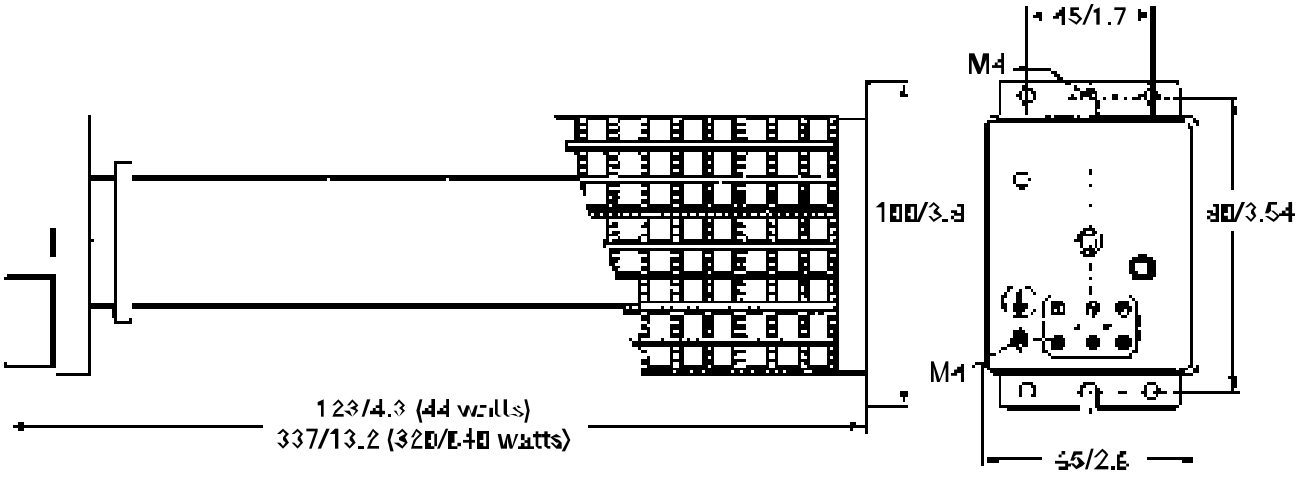
KPD002-501

KPD002-505

Regen Resistors

		115 VAC Drive				230 VAC Drive	
Control	Package Size	Regen Resistor Catalog # (spec)	Watts	Control	Package Size	Regen Resistor Catalog # (spec)	Watts
2.5 amps	A	RG27	44	2.5 amps	A	RG56	44
5 & 7 amps	B	RG27	44	5 & 7 amps	B	RG56	44
10 amps	C	RG4.7	320	10 amps	C	RG10	320
15 amps	C	RG4.7	320	15 amps	C	RG10	320

Dimensions (millimeters/inches)



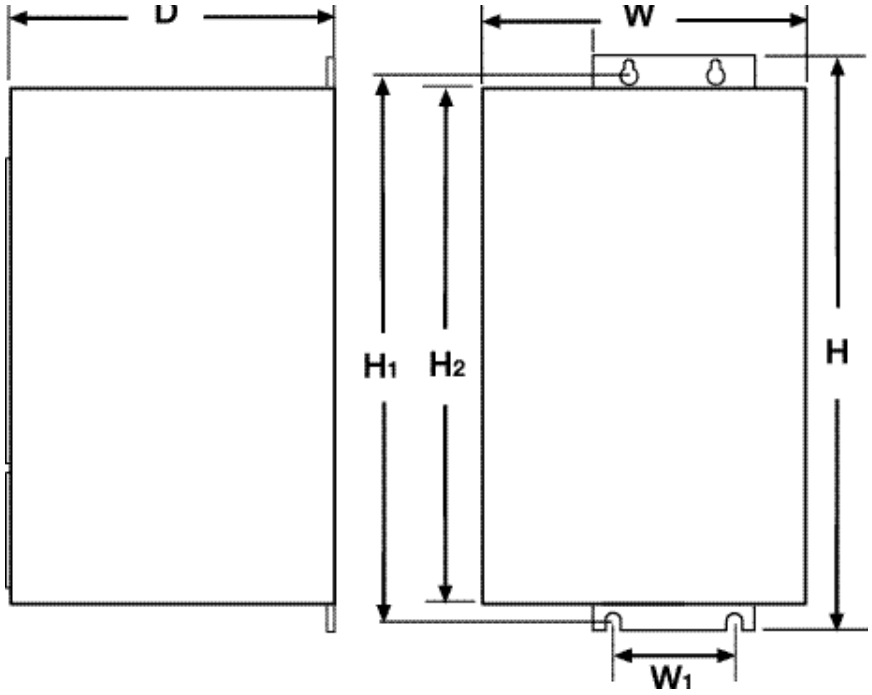
Accessories

Description	Cable Assembly Catalog Number	Length	
		Meters	Feet
CAN Cables	CBL004-501	0.25	0.8
	CBL004-502	0.50	1.6
	CBL004-503	1	3.2
	CBL004-504	2	6.5
	CBL004-505	3	9.8
	CBL004-506	5	16.3
	CBL004-507	10	32.7
	CBL004-508	25	81.8

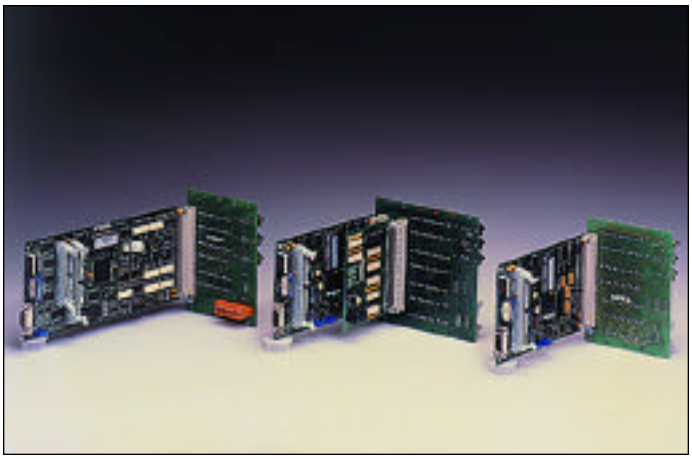
CAN Expansion Modules	Catalog Number
CAN 8 Digital Inputs	ION001-501
CAN 8 Digital Outputs	ION003-501
CAN 24 Relay Outputs	ION002-501
CAN 24 Inputs, 24 Outputs	ION004-501

Miscellaneous	Catalog Number
CAN Operator Panel 3 axes	KPD002-501
MINT™ Interface Library	MNT001-501
Auxiliary I/O Breakout Board	OPT017-501
Auxiliary I/O/ Board Cable (6 ft)	CBL022-502

Dimensions (inches/millimeter)



Package Size	Dimensions (inches/mm)						Weight Lbs/Kgs
	H	H1	H2	W	W1	D	
A	8.07/205	7.67/195.5	6.81/173	3.31/84.0	1.57/40	6.00/152.5	4.86/2.22
B	8.07/205	7.67/195.5	6.81/173	4.29/109	1.57/40	6.00/152.5	5.48/2.49
E	15.8/400	15.12/384	14.05/357	2.84/72	1.42/36	10.43/265	9.92/4.5



1, 2, 3 Axis Motion Controllers EuroCard Family

The 1, 2, 3 Axis Motion Controllers EuroCard Family offers a cost effective solution for controlling servo, vector and stepper motors. This family of cards can easily be installed. All cards program in MINT™, and share a set of accessories and option cards that provide full control capability.

- Up to 3 axis of servo/vector/stepper control
- 2mS update time for all three axes
- 200KHz step output rate
- RS232 or RS485 communications port
- Digital & analog I/O
- MINT programming language
- Multi axis interpolation, gearing, CAMs and much more.
- Pulse and direction inputs for master-follower applications
- Status display for rapid setup and diagnostics
- Non volatile program storage
- Optional memory card for off-line program/data

Programmable Functions

The EuroCard Family is programmed in Baldor's easy to use MINT language. MINT supports a wide range of motion and control functions which are outlined below and described more fully in the beginning of this section.

Positional Moves

Absolute & Relative move types allow high speed point to point motion on one or all axes.

Speed, Acceleration & Deceleration can be defined for each move type.

Trapezoidal profiled moves provide the fastest point to point move but exert the maximum jerk and shock on a system.

S-ramp profiled moves provide a more smooth velocity profile that prolongs the life of machine mechanics.

Contouring allows a stream of point to point moves to be blended together into a continuous and smooth motion.

Interpolated Moves

Linear Interpolation across two or three axes allows positional moves to be defined in terms of a linear X, Y, Z vector.

Circular Interpolation across the first two axes allow a complete or partial arc to be defined.
Contouring allows a string of linear and circular interpolated moves to be blended together into a continuous complex path of motion.

Master/Follower

Electronic Cam replaces the traditional mechanical cam with a servo motor and software programmable cam profile.

Electronic Gearbox & Clutch enables two motor shafts to be linked together in precise synchronization with a software programmable gear ratio.

Flying Shear allows operations to be performed at regular intervals on a continuously moving web. Acceleration, synchronization and return stroke are linked by software to the movement of the product. “Servo” and “Combo” EuroCards support flying shear using two servo axes.

Communications

RS232/RS485 port supports the industry standard full duplex ASCII protocol. This allows easy connection to almost any device with a serial port.

Daisy Chaining allows up to 16 controllers to be linked together on a single RS485 line.

Comms Arrays provide an efficient way to transfer data bidirectionally between a MINT™ program and a separate user program running on the Host controller. Comms arrays give the serial port the same functionality as a parallel dual port ram.

Input/Output

Eight User Inputs are read independently or as a single byte of information. All user inputs may be configured to generate an interrupt to the MINT program. Not opto-isolated.

Eight User Outputs can be written to independently, or as a single byte of information. All user outputs are over- current protected and a fault condition will generate an ERROR command to the MINT program. Not opto-isolated.

Three Analog Inputs can be read as independent 10 bit values.

Expanded I/O is supported using the 24 in, 24 out expansion card.

Fast Interrupt provides position latch within 30µs on all axes.

Programming

The EuroCard Family supports three versions of operating firmware. MINT supports an on-board editor, immediate command execution, and user named variables, arrays and sub-routines. Windows and DOS-based development tools streamline your design process and make field servicing easy.

Process MINT™ supports linear interpolation across all axes. It is easy to implement for many applications including moving web, flying shears, cut-to-length, electronic cams, software gearbox and software clutch. It does not do circular interpolation.

Interpolation MINT™ performs circular interpolation and the functions of PROCESS MINT except electronic camming functions.

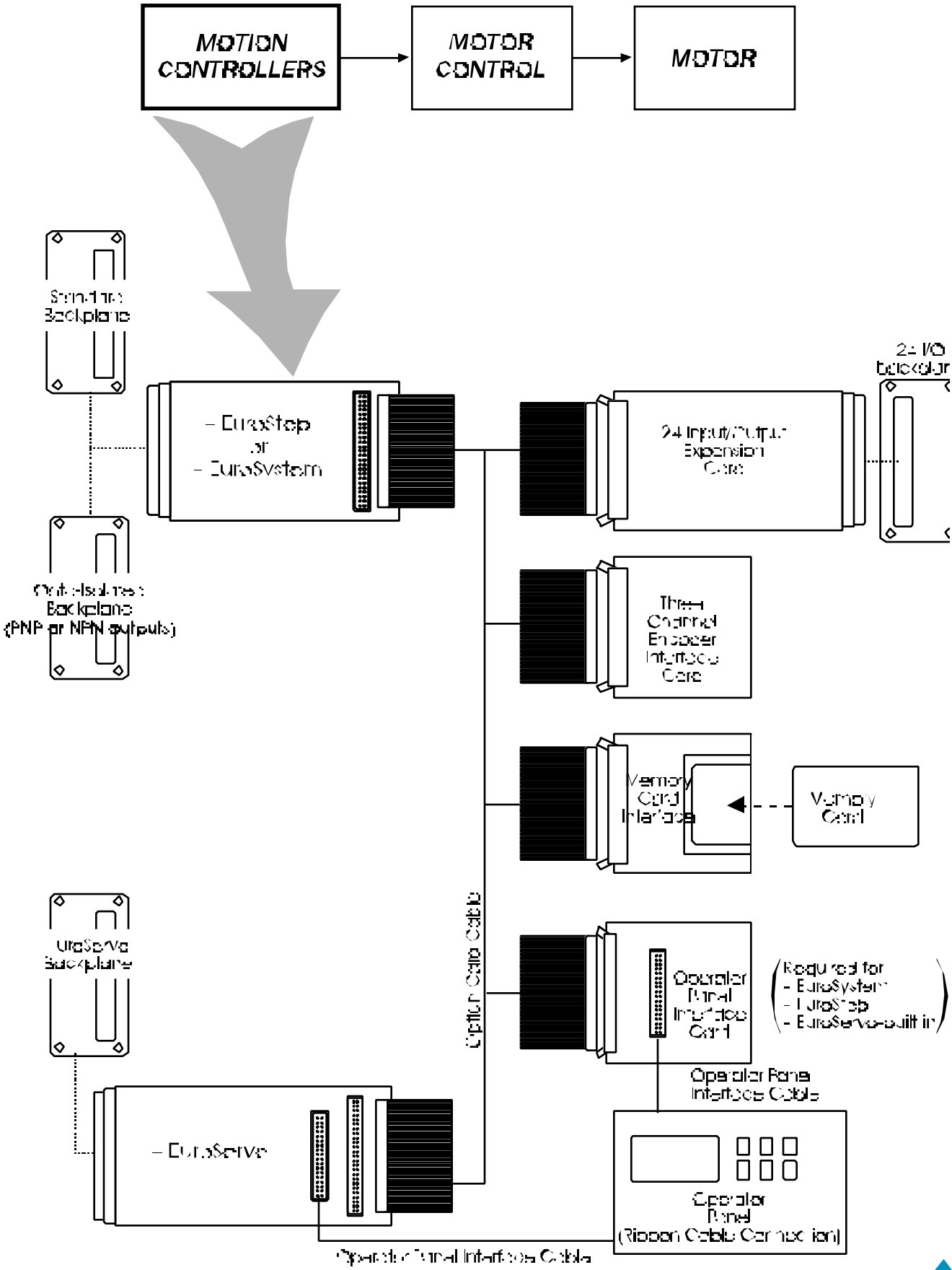
MINT™ v3.28 allows the EuroCard Family to be used as a follower processor to a host computer via the RS232/485 serial port. In these applications, the EuroCard Family undertakes the time intensive tasks of multi-axis motion control, freeing the host processor of PLC for other tasks.

Program Development Tools

A powerful program development and test tool is supplied with all Baldor serial based controllers. This allows for the generation, editing, storage and uploading/downloading of programs to the motion controller. Windows and DOS versions are available (Win 3.X, 95, 98, NT).

cTerm supports a capture utility (software oscilloscope) which is useful tool for aiding in servo tuning.

EuroCard Family



EuroSystem

- 2 axes of servo/vector/stepper control
- 3rd axis of stepper control
- 2mS update time on servo/vector axes
- Max pulse rate of 200 Khz on stepper axes
- Linear and circular interpolation across mixed stepper/servo axes
- Non volatile program storage
- Optional digital I/O expansion board, operator panel interface card

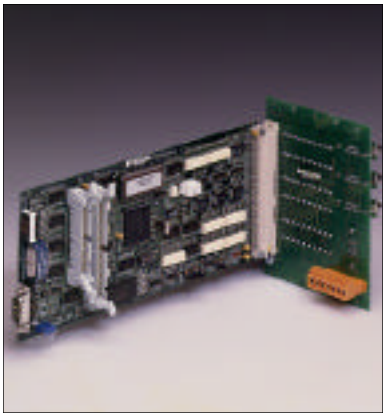
Technical Data

Description	Unit	Specifications
Input voltage	vdc	+5 (500mA)
		+12 & -12 (100 mA)
Operating temperature	˚F	32-113
	˚C	0-45
Weight	lbs	0.33
	g	150
Length	Inch (mm)	6.3 (160)
Height		1.0
Width		3.9 (100)

EuroStep

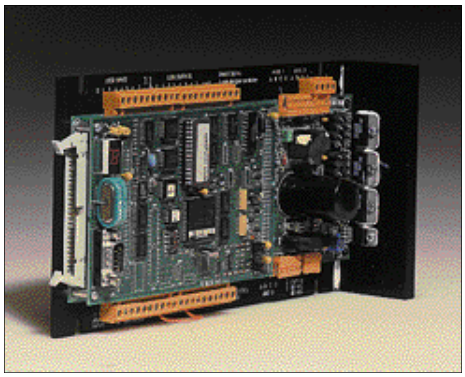
- 3 axes of stepper control
- 200 Khz max output rate
- Linear and circular interpolation
- Non volatile program storage
- Optional digital I/O Expansion Board, operator panel interface card

EuroServo



- 3 axes of servo/vector control
- 2mS update time
- Linear and circular interpolation
- Non volatile program storage
- Standard 8 digital I/O's, 3 analog inputs, and built in interface for operator panel

SmartStep/3



Mint™

- 3 axes of stepper indexer and driver rated at 40V (2A)
- Integrated power supply (AC or DC input)
- Max pulse rate of 200 Khz
- Linear and circular interpolation
- Non volatile program storage
- Expansion bus for I/O, operator panel and other accessories
- Half or full step resolution

Technical Data

Description	Unit	Specifications
Input voltage	vdc	24-40 (3A)
	vac	18-28 (100vA)
Weight	lbs	2.0
	kg	0.9
Length	Inch (mm)	10.5 (267)
Height		2.13 (54)
Width		5.5 (140)

Accessories for EuroCard Family

All controllers and all option cards are designed to fit within a standard Euro 19 inch rack system. An expansion port is available for connecting accessories. A 50 way ribbon cable connects up to four expansion cards to any controller. The maximum recommended length of ribbon cable is 1ft/0.3m.

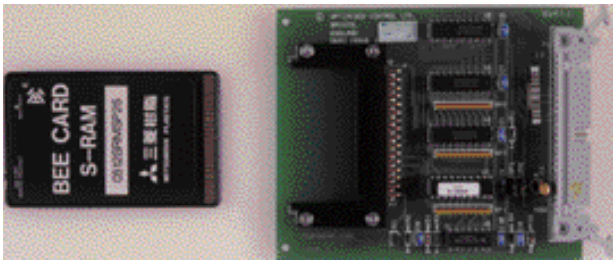
Standard Backplanes

Non isolated backplanes are available for EuroServo, EuroStep, and EuroSystem. Each backplane fits into a standard 3U high 19 inch rack and provides a 96 pin DIN41612 connector that mates with the controller. The backplane provides screw terminations for I/O signals and power.

Opto-Isolated Backplanes

Opto isolated backplanes are available for EuroServo, EuroStep, and EuroSystem. I/O signals are isolated from the processor circuits. Each backplane fits into a standard 3U high 19 inch rack and provides a 96 pin DIN41612 connector that mates with the controller. The backplane provides screw terminations for all I/O signals and power.

Memory Card & Interface Card



Catalog Numbers

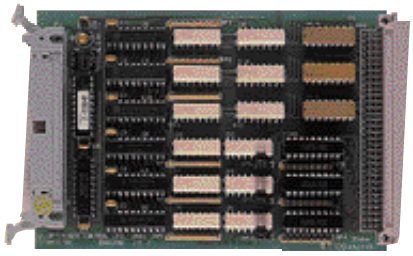
Memory Card Interface	OPT006-501
Memory Card	OPT004-501

The credit card sized memory card can be used to expand the onboard memory to store larger programs, data and arrays.

The memory card can also be used to load program and data into a controller when it is powered up. This allows programs and data to be copied easily from one controller to another without the need for an external PC.

The Memory Card Interface and special firmware are required to connect to the memory card. Consult factory for details of special firmware, type MX and MA.

I/O Expansion Card



Catalog Numbers

PNP Outputs - OPT002-501
NPN Outputs - OPT002-502

- 24 Digital inputs
- Input Voltage 12 to 24 V
- Maximum input 28V
- Logical 0 (Voltage applied)
- Logical 1 (Unconnected)
- 24 Digital Outputs – NPN type
- Output Voltage 12 to 24V
- Output Driver drivers ULN2803 Darlington
- Current sink 400mA per channel and 800mA total for device package

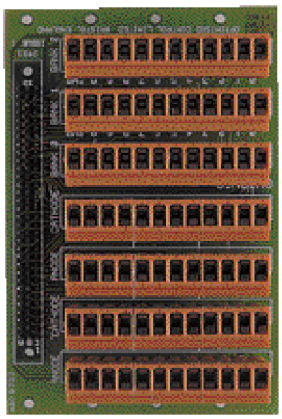
OR

- 24 Digital Outputs – PNP Type
- Output Voltage 12 to 24V
- Output Driver ULN2982 source
- Current sink 400mA per channel and 800mA total for device package

All I/O signals are brought out onto a 96 pin DIN41612 connector. An optional backplane with screw terminations is available. I/O is accessed through MINT using the XIO keyword.

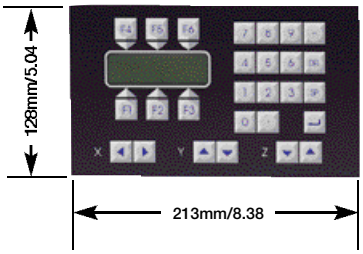
Backplane for I/O Expansion Card

An optional backplane can be used with the I/O expansion card. The backplane fits into a standard 3U high 19 inch rack and provides a 96 pin DIN41612 connector that mates with the 24 expansion card. The backplane provides screw terminations for I/O signals and power.



BPL003-501

Operator Panel



KPD001-501

The Operator Panel provides a cost effective and flexible means for inputting and displaying operator information.

MINT™ provides a powerful set of functions for reading keys and displaying information on the panel, allowing a variety of operator interface types to be configured. Examples of these functions include: INPUT waits for a number to be entered, INKEY reads the next key in the buffer and READKEY reads the key currently being pressed. CLS clears the screen and LOCATE locates the cursor at a specified location. Function key F1 through F6 are designed to support menu driven applications.

Specifications:

- 20 character by 4 line backlit LCD display.
- 27 keys, X,Y,Z jog keys, numeric keypad, 6 user defined function keys.
- Audible buzzer controlled from software BEEP command.
- Powered through ribbon cable.
- 19" rack compatible

Operator Panel Interface Card - OPT003-501

The operator panel interface is used to connect the operator panel to Stepper, Combo, and Smart Step/3. It connects between the expansion port of the controller and the operator panel. The card fits into a 3U slot of a 19" rack. Note that Servo has a built in interface.

3 Channel Encoder Interface Card - OPT007-501

The three channel encoder interface card connects to the expansion bus and provides for three additional encoder inputs. These can be used for master encoder inputs or for position verification.

Encoder Splitter Card - OPT008-501

The encoder splitter takes a single encoder input and buffers it into two outputs. The encoder splitter is used for 'bussing' a master encoder to two slave axes.

EuroCard Family Catalog Numbers

Description	Catalog Number
EuroSystem (Servo/Vector/Stepper)	
RS232 with Interpolation MINT™	ESD001-501
RS232 with Process MINT	ESD001-502
RS232 with 3.28 MINT	ESD001-503
RS485 with Interpolation MINT	ESD002-501
RS485 with Process MINT	ESD002-502
RS485 with 3.28 MINT	ESD002-503
EuroStep	
RS232 with Interpolation MINT	ESD003-501
RS232 with 3.28 MINT	ESD003-502
RS485 with Interpolation MINT	ESD004-501
RS485 with 3.28 MINT	ESD005-502
SmartStep/3 (Stepper with Integrated drives)	
RS232 with Interpolation MINT	SST001-501
RS232 with 3.28 MINT	SST001-502
RS485 with Interpolation MINT	SST002-501
RS485 with 3.28 MINT	SST002-502
EuroServo (Servo/Vector)	
RS232 with Interpolation MINT	ESM001-501
RS232 with Process MINT	ESM001-502
RS232 with 3.28 MINT	ESM001-503
RS485 with Interpolation MINT	ESM002-501
RS485 with Process MINT	ESM002-502
RS485 with 3.28 MINT	ESM002-503

Accessories

Backplanes	Catalog Number
EuroSystem backplane - Standard	BPL001-501
EuroSystem backplane - Isolated PNP	BPL002-501
EuroSystem backplane - Isolated NPN	BPL002-502
EuroServo backplane	BPL004-501
Digital I/O expansion card	BPL003-501
I/O expansion card. 24in + 24 PNP out	OPT002-501
I/O expansion card. 24 in + 24 NPN out	OPT002-502
Three channel encoder input card	OPT007-501
Encoder splitter card	OPT008-501
Memory interface card	OPT006-501
Memory card	OPT004-401
Operator panel interface card. (Included with Servo)	OPT003-501
Operator panel	KPD001-501

Cables	
Option card cable - 1 card	CBL002-501
Option card cable - 2 card	CBL003-501
Serial communication cable. 3m/9.8ft	CBL001-501
Operator panel interface cable 15cm/0.5ft	CBL007-501
Operator panel interface cable 1.5m/5ft	CBL008-501
MINT Interface Library	MNT001-501